

HOTTEST RC GIFTS FOR 2003

LATEST EASY PARK FLYER

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MODEL **Airplane** NEWS

**QUICK-BUILD
THUNDERBOLT**

MODEL TECH'S NEW

P-47 ARF

20 Field-box
essentials

Lightweight spinners
made easy

FIRST LOOK!
ASTROFLIGHT'S
next-generation
charger

FLIGHT TESTED

HANGAR 9 Taylorcraft—ARF classic
GREAT PLANES SlowPoke—sport .40 ARF
SR BATTERIES Bantam—two electric kits

RCX

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MODEL Airplane NEWS

DECEMBER 2002 VOLUME 130, NUMBER 12

ON THE COVER: read Jim Onorato's enthusiastic review of the long-awaited Model Tech P-47 ARF on page 48 (photo by Walter Sidas).
ON THIS PAGE: the SR Batteries Bantam biplane looks great in transparent covering; see Bob Aberle's review on page 76 (photo by Pete W. Hall).

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'Tis the season

This has been a banner year for RC modeling; we've seen an avalanche of new products—from prebuilt, giant-scale aerobats and turbine-powered trainers to easy-to-assemble backyard flyers and more! The only problem with having so many great choices is how to figure out which models to buy next, so to help you fill out your holiday "wish list," we've come up with 25 dream gifts that would even bring a smile to Ebenezer Scrooge's face! Turn to page 26 to see what the editors have chosen as the hottest end-of-year gifts.

While you're in the holiday spirit, why not choose a gift for yourself from our "Hot Field Accessories" guide? From chargers to carrying cases and glow igniters, these gadgets will make your flying time more successful and enjoyable.

EUROPEAN JET SCENE

This month, foreign correspondent and scale columnist Dick van Mourik reports on one of the biggest jet modeling events in Europe, "Jets over Pampa." This annual Belgian meet draws more than 100 pilots and some of the best scale models in Europe, including F-15s, DC-10s and BAC Strikemasters. For an inside look at the latest international jet models, read Dick's article starting on page 34; for even more jet photos from Pampa, see our "Click Trip."



ON THE WORKBENCH

Saving weight is one of the most important aims when you build an electric model, but few lightweight, scale spinners are available. In this issue, electric designer and contributor Mark Rittinger shares how he makes vacuum-formed spinners for his scale models. As Mark notes, "You'll be surprised at what you can create with some sheet plastic, plywood and a little practice!"

If you're looking for a bigger project, check out John Simmance's Solaris biplane. This traditionally built, IMAA-legal model features beautifully detailed CAD plans and is ideally suited to a .90 to 1.20-size 4-stroke. Complete building instructions are online in a "Click Trip," and laser-cut parts are also available (see page 90 for details).

MICRO SCOUT

Do you think a Bristol Scout that weighs less than 1 ounce and can be flown in your workshop is fiction? Don't tell that to Matt Keennon, an AeroVironment engineer who has a passion for designing and building micro RC. To see his miniature model up close, flip to this month's "Final Approach" on page 178.

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THE "GOOD" GUYS

As we enjoy the great number of RC frequencies available to us, it's easy to forget that back in the mid-30s, there weren't any RC frequencies as such; you had to have an amateur license from the Federal Communications Commission (FCC) to operate an RC device.

It was in about 1936 that some of us first heard of a model airplane being flown with RC. This was accomplished by Walt and Bill Good—twin brothers from Michigan. With licenses from the FCC and the experience needed to acquire them, the Goods designed and built their own RC equipment and a model called the "Big Guff." The model has been on display for many years at the Smithsonian Institution's Air and Space Museum in Washington, D.C. The AMA was also born in the '30s, and in 1937, the first RC competition at the AMA National Model Airplane Championships was held. The Good brothers did not win that year, but in the following years, they



Walt and Bill Good and their RC model—the Big Guff (circa 1939).

were the first to win the event three times.

The Good brothers went on with their separate careers after WW II; Walt continued aeromodeling, and he and Bill often consulted each other regarding RC technology. Walt went on to design other successful RC models, notably the Rudder Bug and the Multi-Bug. He was also involved with the AMA, and in the '50s, he became its 11th president. His goal was to make it easier for others to become involved in RC and to do this, he focused on getting specific radio frequencies desig-

nated for RC and on eliminating the requirement for an FCC license.

As a 25-year-old newcomer to RC, I came to know Walt in 1949 at my first AMA Nationals at Olathe, KS. I entered the RC event with a model that used the new Aerotrol equipment, but I didn't have an FCC license. Walt suggested that we test a possible loophole in the FCC rules which, at the time, said something like "A licensed radio operator must turn the radio on and off." Walt stood by when I was ready to fly and switched my transmitter on. I then flew the rudder-only model and, after landing, Walt switched off the transmitter. We went through the Nats RC in this way for several flights. An FCC agent observed the RC activity, but he didn't interfere with what we were doing. Afterward, Walt received a letter from the FCC saying that this type of operation was not legal and would not be permitted in the future.

Walt concentrated his subsequent efforts on getting the FCC rules changed. When I

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became the 13th president of the AMA in 1963, I worked with him on this. By obtaining financial support from the model industry and donations from AMA members, we were able to hire a former FCC commissioner who was also a lawyer to press our case. Walt was appointed as the first chairman of the AMA's newly established Frequency Committee, and he led this group through the early negotiations with the AMA lawyer and the FCC. Over several years, this effort became more and more successful; we first obtained a few license-free RC frequencies and then, finally, the fifty 72MHz RC frequencies we have today were approved—plus 30 more for RC cars and boats.

After retiring from his prestigious position with the Johns Hopkins Applied Physics Laboratory in Baltimore, MD, Walt moved to Florida. He continued to fly RC models—mostly sailplanes—until the early part of this year. He passed away on July 24, slightly more than one year after the death

of his brother, Bill. Those of us who know how much they contributed to RC as we enjoy it today fondly remember them as “the Good guys.” We all owe them our appreciation for the legacy they left us.

JOHN WORTH
Fairfax, VA

BURNELLI BIPLANE?

I recently visited the New England Air Museum in Windsor Locks, CT, during its open house at which you could actually go inside several of the old airplanes on display—very cool! One was a strange-looking, lifting-body design cargo plane designed by Vincent Justus Burnelli. It had twin engines and was really out of the ordinary. In my research on this aircraft, I stumbled on the fact that there was once also a twin-engine biplane—the Remington-Burnelli RB-2—that had a large airfoil-shaped fuselage to increase the aircraft's lifting surface. I want to build a model of this strange-looking



biplane but haven't been able to find a plan. Any help you can provide will be greatly appreciated.

JOHN SALISBURY
Canton, CT

John, you are in luck. We published a plan of the RB-2 in the November 2001 issue of Model Airplane News, and we sell this plan! The model is 76 inches in span and is about 44 inches long. The wing loading of this 9½-pound model is only 16.8 ounces per square foot, but its effective wing-loading value (including the lift from the fuselage) is only 11.22 ounces per square foot. That's in glider territory! Powered by two K&B .45 engines, this model is sure to turn all the heads at your flying field. You can order the plan (\$24.95) by calling (800) 537-5874; ask for plan number FSP1101A. You may also order it online at rcstore.com. Just click on “Plans,” and follow the menu! Have fun!

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NEW PRODUCTS OR PEOPLE hit the model airplane market all the time, so here's the inside source for what's hot and where you can get it. Every issue, we sift through product announcements, show reports, rumors and prototypes to let you in on the best and the latest. Remember, you saw it here first!

AIR SCOOP

by the Model Airplane News crew

HANGAR 9 1/4-Scale Super Cub ARF

For more than 50 years, Piper's Super Cub has escorted thrill-seekers to the farthest reaches of the wilderness, and along the way, it has become one of the most widely recognized aircraft of all time. Hangar 9 pays wonderful tribute to that legacy with its new 1/4-scale version of this American classic. The 100-inch-wingspan model comes out of the box nearly completely built, and it's covered in Worldtex fabric with an authentic antique trim scheme. The kit features a painted fiberglass cowl and wheel pants and factory-installed flaps for excellent slow-speed stability. The Super Cub should be powered by a 1.20 to 1.48 2-stroke, a 1.50 to 1.80 4-stroke, or a Zenoah G-23 engine. It sells for \$449.99.

Hangar 9; distributed by Horizon Hobby Inc.
(217) 355-9511; horizonhobby.com.



OK MODELS New Ducted Fans

If you're looking for an easy introduction to ducted-fan models, look no further than the new DJ-1 and DJ-3 from OK Models. Both planes feature interlocking laser-cut parts for quick and accurate assembly, and both can accommodate optional retractable landing gear. The DJ-1 has a 39.4-inch wingspan and requires a 4-channel radio. The DJ-3 has a 51.6-inch wingspan and requires a 5-channel radio. So what about power? Both models were designed for OK's new .18 ducted fan, which comes with a tuned pipe, a 5-blade fan and all of the necessary hardware. The engine uses a rear exhaust that streamlines the airflow to divert the exhaust away from the plane quickly and efficiently. The ducted-fan unit sells for \$190, and the DJ-1 is priced at \$119. Pricing is not yet available for the DJ-3.

OK Models; distributed by MRC (Model Rectifier Corp.)
(732) 225-6360; modelrectifier.com.

TOP FLITE GOLD EDITION MENTOR

A primary trainer for the U.S. Air Force and Navy, many T-34 Mentors remain in existence to this day. Finding one in kit form for RC flight, however, has been another story. Well, search no more! Top Flite's new Gold Edition 1/5-scale T-34B Mentor features fully interlocking, I-beam, D-tube wing construction for simple assembly, and the balsa-sheeted fuselage and wings keep the model's weight in check. In the box, you'll also find a heavy-duty ABS plastic cowl and tail cone and a large canopy that can be installed to slide open and closed. For an added scale touch, optional retractable landing gear and operational flaps are also available for the 80-inch-wingspan, IMAA-legal trainer, as is a fully detailed scale cockpit. The Gold Edition Mentor should be powered by a .61 to .91 2-stroke or .91 to 1.20 4-stroke engine, and it sells for \$219.99.

Top Flite; distributed by Great Planes Model Distributors
(800) 628-8948; greatplanes.com.



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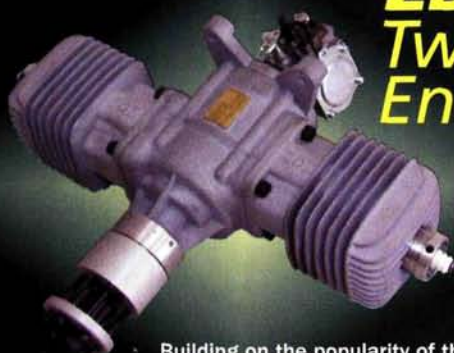
The new Funky 40 from Planes Plus brings new meaning to the term "fun fly." Constructed of laser-cut balsa and ply, the Funky features self-aligning, interlocking fuselage assemblies, CNC-cut foam turtle decks, a clear canopy, molded wheel pants, a fiberglass cowl (and a clear cowl for engine fitting) and CNC-cut aluminum landing gear. Powered by a .40 to .50 2-stroke engine, the 51-inch-wingspan Funky 40 is highly maneuverable and capable of many 3D maneuvers. It sells for \$119.

Over the years, Fiberclassics has built a solid reputation as producer of some of the finest Tournament of Champions models available. And it is this trusted name in aerobatics that is responsible for another of Planes Plus's newest offerings: the Revolution Pro. This 2-meter pattern ship features an all-composite airframe that was painted in the mold to produce an attractive, strong and lightweight structure. The wing fillets come molded into the root area, and a 30mm seamless carbon wing tube is built in. The Revolution comes completely built with the fixed landing gear, servo and engine mounts already installed, and it requires a 1.40 engine. The entire airframe is factory aligned to guarantee the best performance. In addition, 3D-freestyle wings and stabs will soon be available and will be interchangeable with the pattern wings. The Revolution Pro will sell for \$2,200.

Planes Plus (630) 904-5077; planesplus.com.



RC SHOWCASE ZDZ Twin Engine



Building on the popularity of the ZDZ 80B2 RV, RC Showcase now brings us the new twin-cylinder ZDZ 100B2 RV. This rotary-valve boxer twin (with simultaneous firing) has a bore of 42mm and a stroke of 35mm for a displacement of 97cc, and it tips the scales at 5.1 pounds. The crankshaft is supported by three ball bearings and the conrod by two needle bearings for long life. This powerhouse has five Schnuerle ports for stump-pulling torque and uses the proven Falkon electronic ignition for reliability. Output is rated at 9hp, and the recommended prop size is 26x10-12 or a 28x8. The engine sells for \$925.

RC Showcase (301) 374-2197; rcshowcase.com.

E-FLITE Ascent

Though somewhat new to the market, E-Flite is a name we're quickly coming to trust to produce the highest quality sailplanes, and its products such as the new, almost-ready-to-fly Ascent prove that our faith is justified. E-Flite has combined the convenience of a park flyer with the excitement of a high-performance soarer to produce a 54-inch-wingspan model that's sure to appeal to park-flyer and sailplane enthusiasts alike. Powered by a Speed 400 motor with a 10x6 prop (included), the Ascent features a lightweight fiberglass fuselage with a bolt-on wing.

It requires an 8-cell, 800mAh battery pack and sells for \$69.99. E-Flite; distributed by Horizon Hobby Inc. (217) 355-9511; horizonhobby.com.



CLANCY AVIATION

Lady Bug

Need a super-simple scratch-built project? Try Clancy Aviation's new Lady Bug. Constructed of high-quality, laser-cut balsa, the Lady Bug can be built with either an 18- or a 24-inch wingspan and can accommodate various power systems (though Clancy recommends that you try the Speed 280 motor with 2.5:1 gear reduction used in the Yard Bee). Thanks to its fairly easy assembly and stable flight characteristics, the Lady Bug is perfect for first-time modelers. You can pick one up for just \$39.

Clancy Aviation; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.

AIR SCOOT



ESPRIT MODEL

Diablotin XXL

As its name suggests, the XXL is the largest Diablotin available to date. How big is it? Designed for 1/4-scale aerobatic flying, the Diablotin XXL has a 102-inch wingspan, is 100 inches long and weighs more than 20 pounds! It's constructed of balsa and plywood and comes covered in your choice of blue/yellow or red/yellow transparent Ultracote. The kit also features a gelcoated fiberglass cowl and wheel pants, a clear canopy and aluminum landing gear. The Diablotin requires a 3.60 to 4.80 engine and sells for \$879 (ARF); \$759 (ARC).

Esprit Model (508) 764-4990; espritmodel.com.

HOBBY LOBBY

MOBY DICK

If the name isn't enough to command your attention, its slow and steady flight characteristics surely will be. The 79½-inch-wingspan Moby Dick comes ready-built of balsa, ply and spruce, and it features a flat-bottom, high-lift airfoil and flaps. The extremely slow flying and highly maneuverable Moby Dick can be powered by either a .46 glow engine or a Jeti Phasor 45/3 motor; either method will produce the flight characteristics promised. The only difference is in the noise level. The Moby Dick requires a 5-channel radio and sells for \$279.

Hobby Lobby (615) 373-1444; hobbylobby.com.



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CENTURY HELICOPTER PRODUCTS

Hawk Sport

Helicopters are among the coolest products on the RC market, but let's face it: it takes a lot of time to learn to build and fly them. Well, Century Helicopter Products addresses this problem with the introduction of its new Hawk Sport—the perfect .30-size heli for beginners. The Hawk Sport is very easy to assemble and can be ready to fly in only a few hours. All of the major components come assembled, including the main mechanics, the rotor head, the tail gearbox and even the pushrods. It features 31 ball bearings for smooth control response, and though the Hawk is geared toward beginners, it's fully 3D-capable and upgradable. It sells for \$159.99.

Century Helicopter Products (800) 933-0334; centuryheli.com.



HOT BODIES

A-7 Corsair

The quality and availability of ducted-fan models seem to improve daily. Take, for instance, this new A-7 Corsair from Hot Bodies. This almost-ready-to-fly Corsair features a powerful .18 ducted-fan engine with an easy-to-use recoil starter and a tuned silencer for maximum performance. This next-generation ducted-fan model was specially designed with a light wing loading for improved flight abilities such as easy takeoffs, loops and rolls. In addition to the power system, the kit includes a painted fiberglass fuselage, a covered balsa wing, a fuel tank, control linkages, tires and various accessories. The A-7 costs \$599.

Hot Bodies (909) 296-9340; hotbodiesonline.net.



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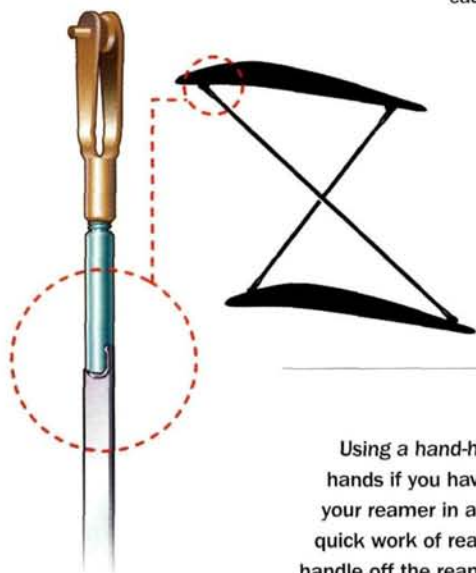
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TIPS & TRICKS

illustrations by David Baker

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.



FLYING WIPERS?

Here's a great idea for flying wires on $\frac{1}{4}$ -scale or similarly large models. Rubber automotive wiper blades usually have two strips of stainless steel embedded in them to keep them straight. The strips measure $\frac{1}{32} \times \frac{3}{32}$ inch and can vary in length from 16 to 32 inches. This material is ideal for creating scale-looking flying wires; simply measure and trim to the required length. With a rotary tool, cut a slot in a threaded brass coupler (such as those offered by Sullivan) and slide the strip into the slot; use silver solder to attach the coupler permanently. The stainless steel really stands out and will make your scale biplane look like a champ.

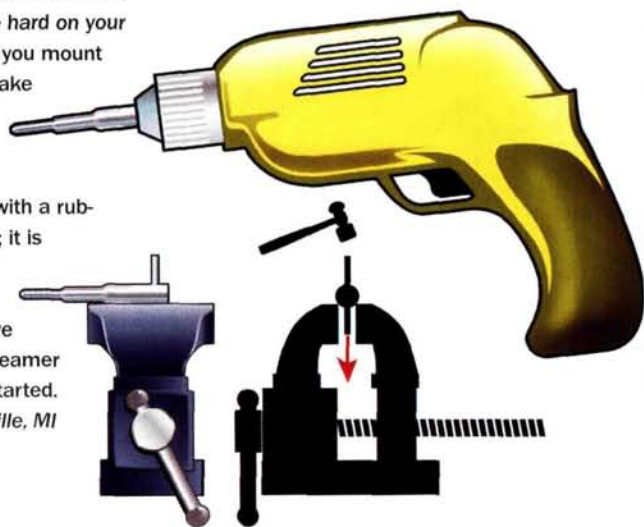
Carl Diehl, Matawan, MI

POWER PROP REAMER

Using a hand-held reamer to size propellers can be hard on your hands if you have more than one or two to do. But if you mount your reamer in a drill press or a hand drill, you can make quick work of reaming multiple props. To take the handle off the reamer, lay your reamer across a vise with the bottom half of the handle hanging down

between the jaws. Gently tap the handle with a rubber mallet or ball-peen hammer; it is press-fit, but if it doesn't come out, heat the reamer to loosen things up. When you've removed the handle, chuck the reamer in your drill press and get started.

Rick Wise, Lambertville, MI



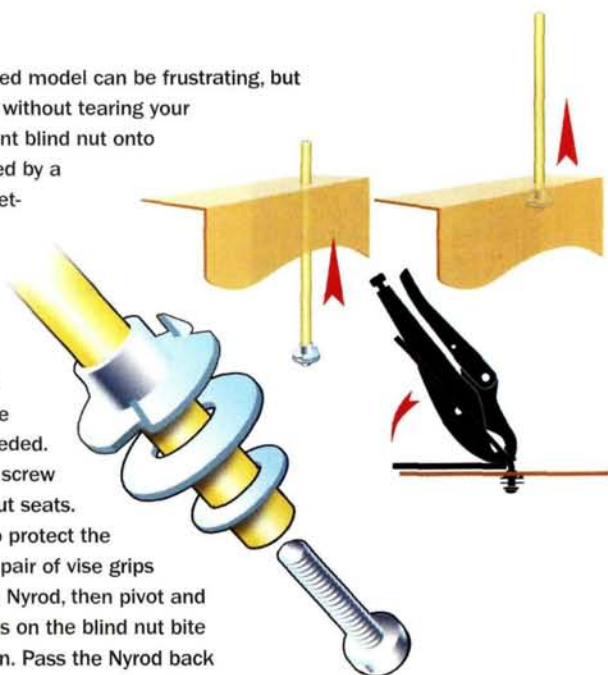
A JEWEL OF A STORAGE DEVICE

If you've ever built a model in which the hardware came sorted in labeled plastic bags, you know how much time and frustration that can save you. You can do this in your workshop with inexpensive jewel cases from your local baseball-card shop. Simply drop your loose small parts into the cases, fold over the tops and tape or staple them closed. Label them with a permanent-ink marker so you'll be able to keep your parts identified and organized.

Ellis Johnson, Seattle, WA

DON'T GO NUTS!

A dislodged blind nut in a finished model can be frustrating, but here's a clever way to replace it without tearing your plane apart. Slip the replacement blind nut onto a piece of flexible Nyrod, followed by a washer. Next, screw a no. 4 sheet-metal screw with a small washer into the end of the Nyrod. Thread the opposite end of the Nyrod through an access hole (cockpit, radio box, etc.) in the model, and direct it to where the replacement blind nut is needed. Pass the Nyrod out through the screw hole and pull it until the blind nut seats. Using a thin piece of plywood to protect the surface of your model, clamp a pair of vise grips onto the sheet-metal screw and Nyrod, then pivot and pull the assembly until the barbs on the blind nut bite firmly into the mounting location. Pass the Nyrod back through the screw hole and draw it back through the access hole; seat the blind nut completely by threading a metal bolt with a washer into it. It's that easy to replace a blind nut—without so much as a scratch on your model's finish!

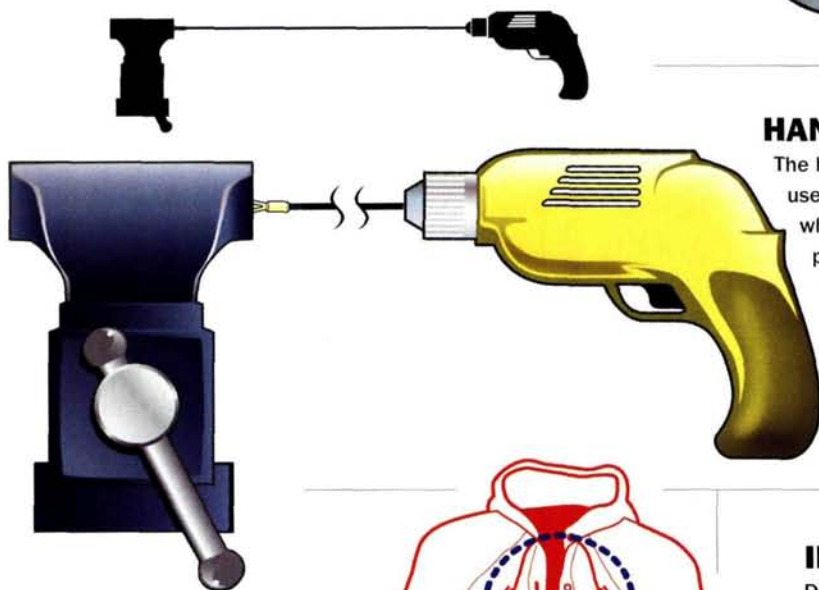


Mark Crawley, Ocoee, FL

FUELPROOFING MADE EASY

Epoxy resin works well to fuelproof your model's engine bay, but it is expensive and can be a real pain to mix and thin so that it can be brushed on, and the cleanup isn't easy. A better choice would be to use a water-based polycrylic protective finish; it is very affordable (about \$8 a pint), is much lighter than epoxy, is odorless, dries in about an hour and is easily cleaned up with water. It is thin enough to be brushed on, and it soaks into the wood to seal it well. Because it is so thin and lightly colored, you'll need to look closely to be sure you have covered all your surfaces.

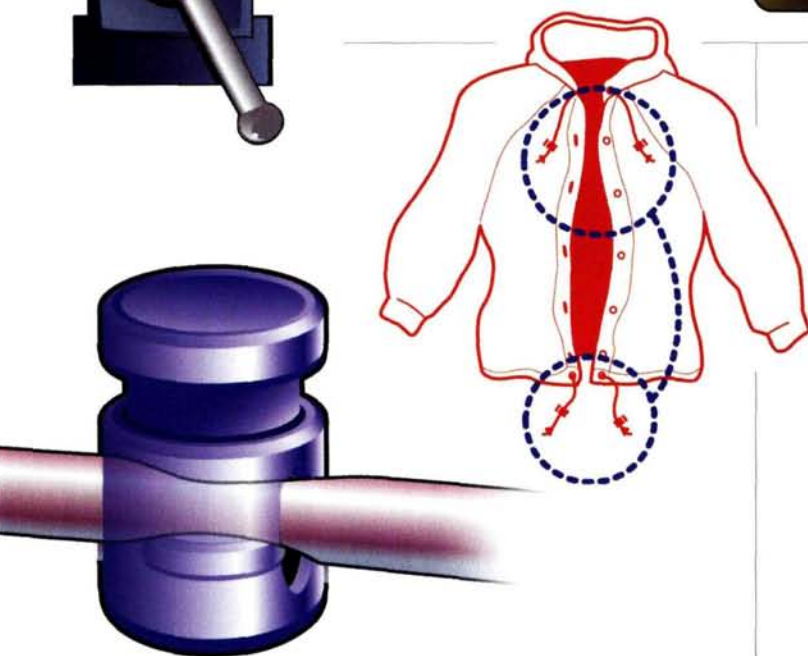
Calvin Malinka, Rialto, CA



HANDS-FREE CLEVIS THREADING

The hardest part of building pushrods is attaching the clevises. If you use pliers, you'll probably lose your grip at least a dozen times, and when you have finished, the rod will probably show scars from the pliers' teeth. A better solution is to set the clevis in a vise (just tightly enough to hold it steady) and chuck the end of your pushrod in a power drill or screwdriver. Guide the other end of the rod into the clevis, and let the drill thread the clevis on.

Patrick White, Lee's Summit, MO



CINCH YOUR FILLER LINE

The spring-loaded mechanisms that are on the drawstrings of many jackets make great pinch valves for fuel lines. Compress the fitting to open the hole in its center and pass your fuel line through. When you let go, the line will be pinched closed, and when you press the mechanism again, the fuel line will open to allow you to fuel your plane.

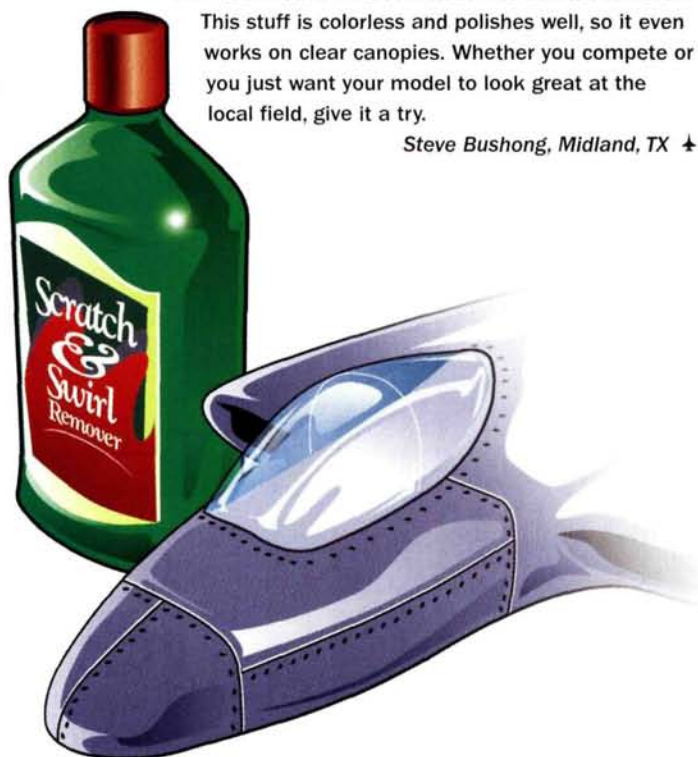
Victor Hamdan, Salta, Argentina

INSTANT SHINE FOR OLD PARTS

Do you have a favorite plane that looks a little worn around the edges? Canopies, cowlings and other plastic parts can become dull and scratched over time, but a great way to restore a like-new shine is with automotive clearcoat haze and scratch remover.

This stuff is colorless and polishes well, so it even works on clear canopies. Whether you compete or you just want your model to look great at the local field, give it a try.

Steve Bushong, Midland, TX ✈



SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable but please do not send digital printouts. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.



Lars Hansson
Virginia Beach, VA
P-47 THUNDERBOLT

Lars started flying RC when he was 13 years old and then stopped; twenty years later, he got back into RC in a big way when he built this P-47 as his first scale model. He built the Jug from the Top Flite Gold Edition kit and added all the bells and whistles; its features include working flaps, retractable landing gear, bombs and working navigation lights. A Saito 1.20 4-stroke engine powers the warbird, and the gunsight serves as the on/off switch. Job well done, Lars!



Bill Grames
Charleston, SC
PA-22 PIPER TRI PACER

Bill scratch-built this classic plane, and he powers it with an ASP .80 4-stroke engine. This beauty has a span of 74 inches, and Bill used a unique method to cover the model. Instead of covering it with iron-on film or fabric, he used brown wrapping paper and white glue, and he painted it with latex paint. We think the results speak for themselves. Bill says the Tri Pacer flies great!



A. Webster Tenney Jr.
Arlington, TX
**BLOHM UND VOSS
BV-141-B**

During WW II, Germany had some of the most unusual aircraft designs; this asymmetrical, light bomber/ground attack plane is one of them.

A. Webster scratch-built the $\frac{1}{12}$ -scale model from a Ziroli plan. The 57-inch-span German menace weighs 5.8 pounds and is powered by an O.S. .46 FX that turns a 3-blade prop. Despite its curious design, A. Webster tells us the plane flies well.

Don Coe
Dousman, WI
SCRATCH-BUILT DJ-2XS

Flying buddies Don and Jerry Franz like to jointly build a project every few years, and this is their latest result: the DJ-2XS (DJ stands for Don and Jerry). The 88-inch-span models have a "golden-age racer" look and are equipped with flaps for extremely slow landing speeds. They used Cub yellow UltraCote to cover the sleek planes and trimmed the covering with Top Flite LustreKote. Saito 1.50 4-stroke engines power both aircraft, and Don and Jerry report that the planes fly great and look spectacular during low flybys. We have no doubt of that!



Ken Peet
Dunwoody, GA
FOKKER D-VII

Ken constructed this Fokker from the plan that was published in the February 1998 issue of *Model Airplane News*. To save weight, he laminated the tail outlines instead of using the suggested balsa pieces. The 25-pound WW I fighter is powered by a SuperTigre 3000 that spins a 20x8 prop. Ken covered the model with Super Coverite and used automotive enamel paint to duplicate the markings from Herman Göring's plane. A Futaba 6XAS radio with Hitec servos fly the plane, and he says that once the model gets off the ground, it flies like a big trainer.



Alf Williams
Kahibah, NSW, Australia
FAIREY SWORDFISH

All the way from down under comes this outstanding Fairey Swordfish WW II British torpedo bomber. Alf scratch-built the 86-inch-span model from 3-views that he scaled up. The all-balsa plane is covered with Sig Koverall and features a functional torpedo launcher, arrestor hook, sprung landing gear and landing lights. Just like on the full-scale plane, the wings fold back to make transporting it easier. To power the torpedo bomber, Alf uses an O.S. 1.60 Gemini twin with a Bolly 18x8 propeller.



Victor Bailey
Fredericktown, MD
STARFIRE 40

Victor had been flying his Starfire 40 for a while and was having a great time with it, but he decided that he wanted something different to fly. So, what did he do? He cut off the rear of the fuselage 7 inches behind the canopy, ditched the horizontal stabilizer and re-glued the vertical fin to the modified fuselage; to make up for the loss of the elevators, Victor enlarged the inboard end of the ailerons. He also added several ounces of lead in the tail to balance the modified plane at the recommended center of gravity. So how does it fly? According to Victor, better than its original configuration! He says the plane performs aerobatics with ease.



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Greg Harvey, Mt. Morris, PA, **EXTRA 300XS**

Greg built his large-scale Extra from an Ohio R/C plan and made a few changes while building it. He enlarged the rudder counterbalance and added counterbalances to the elevators for more control authority. The 84-inch-span aerobat weighs 18 pounds and is powered by a Brison 3.2ci gas engine that uses a Zinger 22x8 prop. The colorful plane is covered with MonoKote, and Sign and Design cut the custom graphics. For added excitement, Greg has a B&B smoke system onboard to paint the sky with.



Daniel Gregory

Federal Way, WA

1913 PONNIER RACER

Daniel found a couple of photos of this neat-looking racer and decided to build a model of it; he drew a plan using 3-views that he obtained from Bob Banka. An Astro Pattern 60 with a 3:1 gearbox that uses 28, 2400mAh cells powers the 1/4-scale model. The 12-pound early racer is covered in antique Solartex, and the forward panels are made of thin aluminum. To maintain authenticity, Daniel used wing warping for roll control. He tells us that in 1913, the full-size plane took second place at the Gordon Bennett race with a top speed of 123mph.



Jon Seppelt, Minneapolis, MN, **SUPERMARINE S-6B**

Jon scratch-built this 1/4-scale Supermarine S-6B Schneider Cup racer from a Jim Pepino plan. A Moki 2.1 that swings an APC 20x10 prop powers the 27-pound model. The racer has a wingspan of 100 inches, and Jon used automotive paint on the airframe. He entered it in the Grassfield R/C Club's annual builders' show and took first place; we certainly aren't surprised! Did we mention that Jon was 15 years old when he started to build the plane, and it took him about 2 years to complete? Pretty awesome, Jon!



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Max RPM	60,000	60,000	80,000	80,000	80,000	80,000
Motor Weight	1.4 Oz.	2.0 Oz.	4.6 Oz.	5.6 Oz.	7.1 Oz.	8.7 Oz.
Weight+Gearbox	1.8 Oz.	2.4 Oz.	6.5 Oz.	7.5 Oz.	9.0 Oz.	10.6 Oz.
Price Motor Only	\$89.00	\$109.00	\$129.00	\$139.00	\$159.00	\$179.00
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25 DREAM GIFTS

by the
Model Airplane News crew

WHAT'S HOT FOR THE HOLIDAY

Yes, it's that time of year again—time to reflect fondly on the past 12 months, to give thanks for all we have and ... well ... to begin begging shamelessly for all the really cool things we've wanted all year but were afraid to ask for. That's right! It's time for the annual *Model Airplane News* Holiday Wish List. Over the past year, we've seen hundreds of new products, and more than a few of them have caught our imaginations. Our space is limited, though, so we were forced to narrow our choices down a bit. We all had our favorites, but after some heated debate, we were able to settle on what you see here. Following are some of the coolest products available on the RC market today. Take a moment to check them out; you might find a thing or two (or 10) to add to your own list.



O.S. .50 SX

More "deer" power for your sleigh!

We all know how well it worked out for Santa when he hitched up Rudolph to the front of the sleigh with the eight original reindeer, and no wonder; 9dp ("deer power") is always better than 8!

Well, you can add a little extra go-power to your favorite .40-size plane without the hassle of

modifying your mounts or cowl openings if you grab yourself an O.S. .50 SX. This engine uses the same mounts and fits in the same space as a standard .46, but it offers 10 percent

more displacement and power. The engine is ringed and features dual ball bearings, so it will run reliably for many seasons to come. With the included O.S. 873 muffler, it sells for \$159.99.

O.S.; distributed by Great Planes (800) 682-8948; greatplanes.com.

HITEC Digital servo programmer

It's smaller than a breadbox

As good as Santa's elves are, they can't program digital servos, and that's where Hitec RCD's Digital Servo Programmer HFP-10 comes in. This

handy unit can reverse a servo's direction of travel for dual-elevator hookups and then match their center points and throws and a whole lot more. Who says you can't teach an old servo new tricks?

Fine-tuning servos for virtually any application has never been simpler; a great gift for the modeler who wants total control.

Hitec RCD (858) 748-6948; hitecrcd.com.



HANGAR 9 1/3-scale Sukhoi

Good things come in big packages, too

Santa's going to have a helluva time getting this to fit under the tree, but there's certainly no harm in asking. Powered by a 60 to 80cc engine, Hangar 9's 1/3-scale Sukhoi is capable of some of the most aggressive 3D maneuvers imaginable. The almost-ready-to-fly, 97-inch-span model is constructed of balsa and ply and

covered in UltraCote. The kit features a painted fiberglass cowl and wheel pants and sells for \$849.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.



MEGATECH Nitro Air Strike

On Donner, on Dancer, on Prancer ...

Even the reindeer had to learn how to fly; too bad they didn't have the Nitro Air Strike trainer from Megatech to help them. It comes almost assembled with the .46 engine installed; no more than 15 minutes' worth of work gets it airborne. Simply install the landing gear, tail and wings. Ready to make the leap to gas power? Put the Nitro Air Strike at the top of your list. It sells for just \$379.99.

Megatech (201) 662-2800; megatech.com.



BOB VIOLETT MODELS

F-100D

A gift with an after-burner!

Not really, but it uses a fire-belching turbine engine! The beautiful F-100D from Bob Violet Models is for the serious modeler who demands the very best in quality and performance. The model is designed to operate with a RAM 1000, Pegasus, or JET-CAT P120 or 160 turbine engine, and it has a wing area of more than 1,200 square inches. The Super Sabre is very easy to assemble and maintain, and it can be completely disassembled to fit into its own BVM jet transportation case. The model is incredibly scale in outline and appearance, it uses a scale NACA 64A007 wing airfoil, and it has operational leading-edge slats for great takeoff and landing performance. The Go-Fly version of the kit (including everything except a radio, engine and finishing supplies) is priced at \$6,890. It's the ultimate in engineering, and it's a great value, too!

Bob Violet Models (407) 327-6333; bvmjets.com.



FMA DIRECT Co-Pilot

Here's wishing you a crashless New Year!

Boy, wouldn't that be a great gift to share with a newcomer to the hobby

... never crashing while learning to fly? Well, the Co-Pilot flight-control stabilization system from FMA Direct is about as close as you can get to making a model practically crash-proof! This unit uses infrared heat sensors and constantly scans the horizon to make adjustments in pitch and roll; it keeps your model flying straight and level. It takes only a few minutes to install and set up, and you can easily adjust its sensitivity; you can even turn it on and off in flight. Reasonably priced at less than \$120, this is a gift that keeps on giving. What's the value of avoiding a crash? Why, it's priceless!

FMA Direct (800) 343-2934; fmadirect.com.

GREAT PLANES RealFlight G2

Let it snow, let it snow, let it snow

Thanks to Great Planes, your flying times no longer have to be set according to Mother Nature's clock; you can spend the entire winter at the controls if you want to. The RealFlight G2 flight simulator is one of the most versatile and easy-to-use systems on the market. You can choose from 17 airplanes, 11 helicopters and more than 200 customizable features for the models. In addition, the special multiplayer feature allows you to practice with up to seven of your flying buddies. The G2 is compatible with all previous RealFlight add-on packs, and a special interface cord is available separately for those pilots who prefer to use their own transmitters. RealFlight G2 sells for \$249.99 (including Futaba controller).

Great Planes Model Mfg. Co. (800) 682-8948; greatplanes.com.



ZAP CA pack

The stockings were glued to the chimney with care

Not every gift basket contains 10 kinds of fruit and enough cheese and crackers to stock a winery—not if it's a gift basket from ZAP, anyway. A ZAP basket is the perfect addition to any modeler's holiday wish list. From kicker to finishing resin, thread-lock to epoxy, ZAP really does have an adhesive for every occasion. And if you play your cards right, so could you. A year's supply of adhesive—what more could anyone ask for?

Zap Glue; distributed by Pacer Technology (800) 538-3091; pacertech.com.



Deck the halls ...

... of the Anaheim Convention Center. That's what we'll be busy planning to do this holiday season. If you're thinking about getting out of town this spring, boy—do we have a destination for you. Check out the first ever Radio Control Expo (RCX) on May 3 and 4, 2003. RCX will feature music, celebrity races, contests and prizes. In addition, there'll be plenty of RC planes, cars and boats that you'll be able to test out, thanks to several demo arenas and racetracks. It's definitely something you won't want to miss, so start dropping hints. Here's one: plane tickets fit very nicely in a stocking.



WISH LIST



BALSA USA **Fokker DR-1 triplane**

Three times the fun

Rule the skies over your flying site with the most recognizable aircraft of WW I: the Fokker DR-1 Triplane! The Balsa USA kit is easy to build and just as easy to fly. The kit features a rolled, full-size plan, formed landing gear and cabane-wire struts, a step-by-step photo-illustrated manual and most of the hardware needed to complete the model. With a finished weight of 13 to 14 pounds, the 70-inch-span plane requires a 1.20 to 1.50 4-stroke or 23cc gas engine for exciting dogfights. It's priced at only \$249.95, so Mrs. R. Baron can surely stuff your stocking with this one.

Balsa USA (800) 225-7287; balsausa.com.



FLAIR PRODUCTS **Stearman** **Ghost of Christmas past**

Even Scrooge would have welcomed this one. The newest addition to the Flair Products "Classic Scale" series, this PT-17 Stearman

is an authentic reproduction of one of WW I's most recognizable fighters. The kit features CNC-machined and die-cut parts, strip and sheet wood, a dummy engine, scale wheels, all of the necessary hardware and a full-size plan with instructions. In addition, Flair provides vacuum-formed moldings for the detail trim areas and fiberglass moldings for the forward fuselage and dummy crankcase. A fully sprung and damped undercarriage, various moldings for the windcreens and fairings and a complete closed-loop control system for the rudder and elevators round out this incredible package. The PT-17 Stearman sells for \$450.

Flair Products; distributed by Radical RC (937) 237-7889; radicalrc.com.



wing and tail feathers are built of balsa and covered in a heat-shrink plastic film for fast and easy assembly. With a light wing loading, the included glow engine and ducted-fan unit offer great performance! Almost everything you need to get airborne is included in the kit; just add your favorite radio system, and you'll be ready to rock!

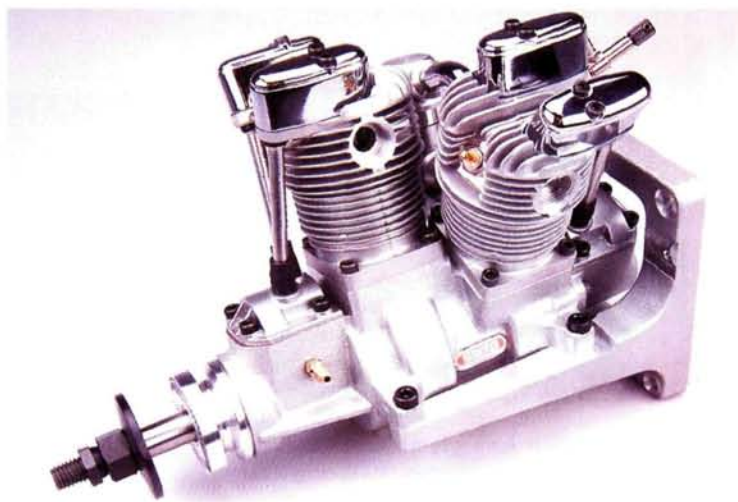
Hot Bodies (909) 296-9340; hotbodiesonline.net.



MRC/ALTECH **EZ Dago Red** **Move over, Rudolph**

Given a choice, we think Santa might prefer to have this record-setting racer guiding his sleigh. He would certainly have a better chance of making it around the world in one night. Distributed by MRC/Altech, the OK Models EZ Dago Red comes almost ready to fly with a lite-ply and balsa airframe covered with a laminated skin made from a plastic-foam base, a synthetic paper layer, graphics and a layer of clear Mylar. The EZ line of ARFs has come to be known for its high-quality construction and outstanding performance, and the Dago Red is certainly no exception. It features retractable landing gear, a chrome-plated plastic spinner and a vacuum-formed plastic cowl, and it should be powered by a .40 to .50 2-stroke or .70 to .80 4-stroke engine. Best of all, it's priced at just \$300.

MRC/Altech (732) 225-6144; modelrectifier.com.



SAITO **200Ti** **Two cylinders of in-line fun**

Saito engines are always a great choice for someone who is hard to shop for. You'll never hear a modeler say glumly, "Oh, it's just another twin-cylinder Saito 4-stroke" They'll be jumping for joy when they unwrap a new 200Ti, we promise you! Arranged in an offset, in-line cylinder configuration, the Saito 200Ti comes with its own aluminum engine mount and a single carb to feed both jugs. Reliability and performance are a given. Priced at less than \$750, this big twin is perfect for scale warbirds, since its narrow design allows it to fit into tighter engine cowls and fuselages. Its 2ci displacement makes it a great choice for super-charging your typical 1.20-size aerobat.

Saito; distributed by Horizon Hobby (217) 355-9511; horizonhobby.com.

HOT BODIES **A-7 Corsair** **For the jet set**

If you're a jet fan, why not ask Santa for the almost-ready-to-fly A-7 Corsair? This cool, .18-size glow-powered, ducted-fan model spans 44½ inches and sports a finished fiberglass fuselage. The



AJ ENGINEERING **Wolf Predator** **Big power for big fun**

Nothing says "Happy Holidays" like a new engine under the tree! Just imagine: a 1.8ci gas burner rated at 3.2hp at 7,000rpm; why, that's enough power to replace a couple of Santa's reindeer! AJ Engineering's Wolf Predator includes a Bisson muffler, C&H Syncro electronic ignition and Walbro carburetor. The engine has a side-mounted carburetor and exhaust port for easy installation in just about any 1.20-size plane. For only \$529.95, this engine is sure to please all year long!

AJ Engineering (920) 893-9675; ajengineering.com.



SIG MFG. **Rascal 110 ARF** **A flyer worth wishing for**

With its classic looks and distinctive elliptical wing and tail, the new Sig Rascal 110 ARF is a design that's as easy on the eye as it is to fly. The new .90-size Rascal ARF comes 90-percent assembled and covered with Oracover polyester material in two unique, two-color trim schemes. A complete hardware package rounds out the Rascal 110 ARF package. The model's 110-inch, two-piece wing makes transportation to the flying field a snap. If you have ever wanted a big impressive flyer with vintage appeal, the Rascal 110 ARF, priced at \$599.99, is a dream gift worth wishing for!

Sig Mfg. Co. (641) 623-5154; sigmfg.com.



HOBBY LOBBY **Mini Reno Racer**

When the weather outside is frightful ...

... grab this Mini Reno Racer and head to the local gymnasium. This 28-inch-wingspan slow flyer is capable of both indoor and outdoor flight. The fuselage and wing come already assembled and painted. In addition to the factory-installed ailerons, a special shock mount for the motor comes installed on the firewall. Hobby Lobby recommends that you power this little beauty with a GWS mini geared motor. Here's the best part: it can be yours for just \$79 (in case your letter doesn't reach the North Pole in time).

Hobby Lobby (615) 373-1444; hobby-lobby.com.



FUTABA **9C transmitter**

A premium radio you can afford

The Futaba 9C series (of which the 9CAP is the pinnacle) is a true jack-of-all-trades. The range of features rivals many premium systems, but it has a price that won't break the average modeler's holiday budget. It fits neatly between the popular 8U and the top-of-the-line 9Z series, and it can handle almost any model in your stable, including sailplanes and helis. It is exceptionally user-friendly and offers a myriad of configurations and adjustments. With eight nameable memory slots (upgradable to 14), this might be the only radio you ever need; and at prices from \$379 to \$449 (depending on features), you'll have plenty of dough left over for those after-Christmas sales!

Futaba; distributed by Great Planes
(800) 682-8948; greatplanes.com.

LANIER RC **CAP 232**

Damn that winter wonderland

You're going to have a tough time waiting for the warm weather to take this baby for a test run, but good things come to those who wait. Few would argue that the Lanier CAP 232 kit is one of the most popular aerobats ever, and the almost-ready-to-fly version certainly lives up to the high standard its predecessor set. Constructed of lite-ply and balsa and covered with red, white and blue UltraCote, the Lanier CAP features plug-in, balsa-sheeted, foam-core wings, airfoil-shaped tail feathers, a painted fiberglass cowl and wheel pants, a foam-core turtle deck, balsa-sheeted hatch/canopy and a complete hardware package. It requires a 1.5 to 3.2 2-stroke or 1.60 to 3.0 4-stroke engine, and it sells for \$420.

Lanier RC (770) 532-6401; lanierrc.com.



WISH LIST



AIRBORNE MODELS **Extra 300S**

For those who've been Extra nice

The Extra 300S from Airborne Models is a great way for sport fliers to live out their fantasies of being famous airshow pilots. The 80-inch-span ARF Extra comes covered in Patty Wagstaff's trademark red, white and sapphire blue trim scheme, is built light yet strong and has excellent flight characteristics. The plane comes with a stocking full of hardware for quick and easy assembly. ARFs make great gifts; the elves need only add a 1.60 2-stroke engine and a radio system to this beauty.

Airborne Models LLC (925) 371-0922; airborne-models.com.

GREAT PLANES

Pitts Special

**A 1/3-scale
stocking stuffer**

If your idea of a great gift is one with two wings and the ability to perform amazing aerobatics, then the new 1/3-scale Pitts Special ARF from

Great Planes should fit nicely under the tree! This almost-ready-to-fly biplane has a 68-inch wingspan and is beautifully covered in red and white Monokote. All the fiberglass parts have been painted to match the covering, and an impressive set of decals and hardware completes the package. From kit box to the flying field, assembling the Pitts (which is priced at less than \$400) will take only a few hours. You'll want to fly this one forever!

Great Planes Distributors (800) 682-8948; greatplanes.com.



Top Gun dream

Scale tidings for the New Year!

If you have even the slightest interest in scale model airplanes, then you know that Top Gun is the event where you can see the best of the best compete! The experience of seeing famous personalities such as Terry Nitsch, Nick Zirolli, Ramon Torres and Bob Violet—no name just a few—is amazing!

A great gift idea would be a trip to Top Gun 2003 to be held at Lakeland Linder Airport in Lakeland, FL! Heck, an airline ticket and a hotel reservation would both easily fit in a holiday stocking. If you have some free time next April 23 to 27, start dropping those hints early! Be really, really good for the rest of the year, and maybe you'll be rewarded with a great scale experience found

nowhere
else in
the world!



BBI Pilot figures

Elf-size treats

Rumor has it that the poor economy and rising taxes at the North Pole have the elves contemplating a strike for higher wages—which would, of course, bring the action-figure industry to a virtual standstill. But thanks to companies like bbi, we just might be able to salvage the season. Though originally marketed as collectible action figures, bbi pilots are among the most accurate and finely detailed pilot figures available. And though they're not quite as authentic-looking as elf-made products, they're pretty close. Available in a variety of styles, including modern and WW II aviators, bbi figures feature authentic-looking cloth flight suits, helmets and visors/goggles, oxygen masks and hoses, parachutes and straps, watches, zippers, buckles and a variety of other equipment. bbi figures range in price from \$29.99 to \$49.99. These Royal Air Force and German Luftwaffe fighter pilots are the two newest figures to hit the market; they each cost \$39.99.

bbi; a division of Blue Box Toys (212) 255-8388; blueboxtoys.com. ✈



THUNDER TIGER **Lazy Tiger**

**Do visions of Mustangs
dance in your head?**

I know what you're thinking: "Mustangs can't dance." Well, there's an exception to every rule, and Thunder Tiger's Lazy Tiger .51 is it. This 42-inch-wingspan aerobat is capable of extremely slow flight and unbe-

lievable aerobatics, enabling it to ... well ... dance across the field. Constructed of built-up balsa and ply and covered in UltraCote, the Lazy Tiger comes almost-ready-to-fly and can be assembled in just a few short hours. It features pre-hinged control surfaces and a complete hardware package. The Lazy Tiger should be powered by a .20 to .30 2- or 4-stroke engine, and it sells for \$119.99.

Thunder Tiger; distributed by Ace Hobby Distributors (714) 544-0633; acehobby.com.

WATTAGE **F-86 Sabre**

All we want for Christmas

We have a feeling Santa and his elves are going to be inundated with requests for this one this year. Who wouldn't want a sound-barrier-breaking fighter to safeguard their backyard from enemy MiGs? OK, so it isn't the real thing; but it's pretty close. The almost-ready-to-fly F-86 Sabre from WattAge is constructed of lightweight and durable injection-molded foam that has been painted silver. Powered by a WattAge 400F fan motor and power-fan unit (included), the F-86 Sabre comes with all the necessary hardware, a photo-illustrated instruction manual and a complete set of decals with your choice of two scale trim schemes. It sells for \$99.99.

WattAge; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.



JETS OV PAMPA

European jet action



ER

PHOTOS BY DICK VAN MOURIK

by Dick van Mourik

In mid-July, pilots from all over Europe converge on the Pampa Model Fighter Club field in northern Belgium for the Jets Over Pampa fly in. Now in its 13th year, it has grown from a modest national show into a premier two-day event. More than 100 pilots participated this year, and all seemed to have a great time.

Jets Over Pampa is not a competition. On Saturday, pilots gathered for some flight training and to exchange information and ideas, while Sunday's highlight was an airshow that featured some of Europe's best jet jockeys. Perfect weather and lots of high-flying action ensured that no one went home disappointed.

Marlijn Penninx's F-15.



Geert Van De Voorde's F-16 is finished to resemble a full-size plane stationed at Kleine Brogel Air Base in Belgium.



Marc Thienpont's F-16 is a work of art. Check out that striking Tiger scheme!

IT'S SHOWTIME!

The best part of any flying event is, of course, the flying, and there was certainly plenty of that! Brothers Dick and Bert van de Vecht, well known among their peers,

brought along several jet models. The most impressive one in their hangar is the de Havilland DH-180 Swallow, which looks very similar to the German Me-163 Komet. Powered by a Jetcat turbine, this kit-built model spans 89 inches and weighs 28 pounds, and Dick and Bert fibreglassed and painted it with Humbrol enamel paint. This model dispels the myth that turbine models are destined to have short lives; the Swallow has logged hundreds of flights and remains alive and well!

One model not in short supply was the F-16, and the Avonds belonging to Geert Van der Voorde and Marc Thienpoint were definitely crowd favorites. Modeled after two planes in a Belgian squadron based at Kleine Brogel, these aircraft are a welcome change from the usual gray camouflage. Both models are powered by AMT Netherlands Mercury HPs. Marc's F-16 is a

work of art in every respect: it is immaculately built and detailed, and the attractive tiger scheme is enough to make any modeler envious. It's finished with two-part acrylic paint just like the full-size plane it's modeled after. The 53-inch-wingspan model weighs 20 pounds and features Robart retracts. Marc has several Avonds designs in his squadron and says he's extremely satisfied with all of them, but the F-16 is his favorite.

But Geert and Marc's spectacular fighters weren't the only impressive F-16s at Pampa. Marijn Penninx's scratch-built F-16 earned its share of the spotlight. At 20-percent scale, this model is huge; it is available as a kit from AMT Netherlands. Modeled after a Dutch demo version of the famous Falcon, Marijn's fighter is extremely accurate in every respect. With a wingspan of slightly more than 80 inches, this model's flying weight is between 33

and 37 pounds, depending on the turbine used for power. In Pampa, Marijn used an AMT Netherlands Olympus turbine, and it provided a very scale-like performance. Marijn's F-16 features many scale touches, including working scale retracts.

Of course, F-16s weren't the only models in abundance. Within Europe, the Avonds F-15 is probably the



Few would argue with the opinion that Frank Lammers' scratch-built DC-10 was the star of the show.



Ian Russel's JetCat 120-powered F-15 was impressive in flight. How's this for a graceful takeoff?



Here, Frank Lammers prepares his DC-10 for its next flight.

most widely modeled scale turbine—no less than 15 were at Pampa. Among the notables was Ian Russel's Jetcat 120-powered F-15 that weighed 22 pounds. Ian flew it expertly, demonstrating it with all the ease of an aileron trainer.

Mark Leavesley brought along the ducted-fan-powered BVM T-33 originally built by Ian Richardson. Mark converted it to accommodate an AMT turbine, which provides the 18-pound model with incredible performance.

A model-maker by trade, Paul Boyle finished his Jetwelt Santorin in a non-scale but very authentic-looking Russian paint

scheme. Powered by a Jetcat 120 and flown with a JR radio, the 30-pound Santorin features Eurotract retracts and a Humbrol enamel finish. The model has very docile handling characteristics and can perform slow aerobatics with ease. Sadly, radio failure cut short its Pampa appearance.

It's spectacular to watch model jets streak across the sky at 250mph, but I was equally impressed by the graceful performance of the BAC 145/176 Strikemaster designed and built by Peter Mayer of Germany. Peter originally designed this model as an easy-to-fly jet trainer that could also be used for scale competition. His design seems to be quite successful; several BAC models were at Pampa this year. At 22-percent scale, the large model's wingspan is 98 inches, and it uses a Jetcat P-120 for power. The prototype (which is still flying) weighs about 45 pounds, but later production models weigh 34 pounds. A neat feature is the onboard smoke system that leaves a very convincing smoke trail.

Most would agree that the

star of this year's show was Frank Lammer's scratch-built DC-10 finished in Royal Dutch Airlines colors. Originally powered by two O.S. .61 engines, the DC-10 now uses a single AMT Netherlands Mercury HP engine for power. Although the wings span a massive 137 inches, the model weighs only 32 pounds. Frank installed Spring Air retracts and uses a Futaba 9 ZAP radio for control, and believe it or not, this impressive model was finished in car paint.

Congratulations and thanks to the organizers and participants for yet another successful Pampa fly in. I can't wait until next year! ✈



Peter Mayer and Hajo Haschmann with Peter's scratch-built BAC 145/176 Strikemaster—one of four Strikemasters at Pampa this year.

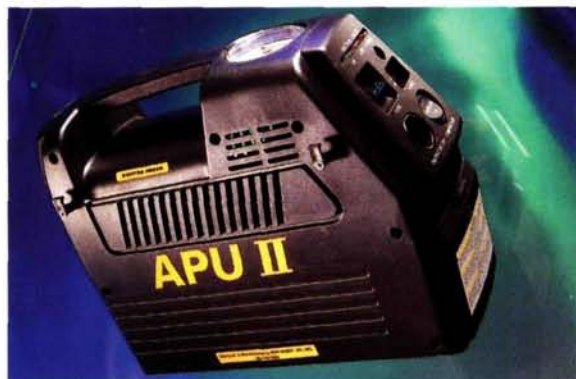
HOT FIELD

From helping to fill the model's fuel tank and start the engine to holding our models securely so we can work on them safely, field accessories are an important part of our hobby. Several of them increase safety, and many are absolutely necessary for getting our models into the air. The list of ground-support equipment is an impressive one, but for beginners, just learning what's available can be a daunting task. If you're in the market for pit-area accessories, you're in luck!

Let's take a closer look at some of these field-box fillers. When you get to a point in the hobby where you want a little more convenience, collecting field accessories can become a very enjoyable pastime in itself! You don't have to spend a lot of money to enjoy using many of these great time and labor savers. Who has the biggest field box with the neatest accessories? It could be you! Let the tool wars begin!

Getting organized

Being organized makes our lives less complicated. The most basic accessory is something that holds all the other accessories: a field box. It groups all of your tools so you can find them more easily. Most field boxes have a compartment for a 12V battery to power other items in the field box. A power panel helps direct the power output for various other accessories. Field boxes, carrying totes and portable workstations can be big or small, fancy or plain; it's your choice. There are many to choose from. After your basic box and storage requirements have been met, your field accessories become more specialized and serve specific functions.



MINI HOBBY The APU II (auxiliary power unit) from Mini Hobby is a great way to keep the pit area uncluttered. Ideally suited to giant-scale and jet pilots, the APU II includes a built-in 12V power pack (to energize a starter) and a built-in charger with 120AC and 12V DC connections. It contains a glow-plug driver and analyzer circuit, a fuel pump for gasoline, nitro glow fuel and kerosene, and a 230psi air compressor with pressure gauge for recharging pneumatically driven retracts and other systems. There's even a built-in starter-probe holder for the ducted-fan pilot. What more could you want?

■ APU II, \$249.99



THE WORLD MODELS Assembled field boxes and field stands such as these from The World Models remove all the hassle from assembly. Just install your battery and power panel, add your favorite tools and accessories and head for the flying field. You don't even have to paint these well-made units. Available in several colors, these stands and field boxes make a good foundation on which to build your aircraft support system.

■ Field box, \$49.99
■ Stand, \$24.99



HANGAR 9 A good way to outfit yourself is to buy your field accessories from one source. Field equipment is often packaged together like this equipment from Hangar 9. To get started, you'll typically need a field box, a power panel, a 12V battery and charger, a fuel pump and an electric starter.

■ Prebuilt Fieldmate flight box, \$39.95
■ 12V sealed battery, \$20.95
■ Battery charger, \$10.95
■ Electric fuel pump, \$14.95
■ Electric starter, \$31.95



MICRO FASTENERS A plastic screw box is a great way to organize the small screws, nuts and washers that modelers commonly use. I have several boxes, and I use them to store clevises, lock collars, servo screws and a dozen other tiny gizmos that are easily misplaced. The boxes come in various sizes (hardware not included), and you can buy them at hobby shops and department stores. Assorted boxes with hardware are also available from Micro Fasteners. Believe me, these boxes are worth their weight in gold when it's time to find the exact screw or nut you need for your model.

■ Screw boxes, \$1.99 to \$15.99 (hardware not included)



ACCESSORIES

A guide to ground-support equipment

FOR RC PILOTS

by Gerry Yarrish

HOLDERS & CARRYING CASES

To some modelers, maintenance stands and radio carrying cases are total extravaganzas; to others, they are absolute necessities. Again, it's your hobby and your choice when it comes to how you treat your equipment. Working on your model when it's slightly elevated takes a lot of strain off your back and makes it much easier to assemble and adjust. Carrying cases protect your expensive transmitter while it is stored in your workshop and keep dirt, dust and direct sunlight away from them at the flying field. Many types are available, from inexpensive plastic ones to strong, metal-clad, lockable units. There's something for everyone.

Another useful accessory is a transmitter tray that supports your radio with a neck strap or brace. These allow you to develop a finer feel of the control sticks and will relieve the muscle strain caused by holding a transmitter. Some higher-end computer radios are fairly heavy, and a tray will pay for itself in no time.

One constant holds true, no matter how long you've been in the hobby: sooner or later, while storing your model or transporting it to the flying field, you're going to damage it. For some reason, the wings seem most susceptible to hangar rash. Carrying bags are the answer. Cloth wing tote bags are all the rage now, and if you travel to a lot of out-of-town events, they will save you much repair time. They're just what the well-equipped traveler needs!

If you need an elevated work stand for your model, the Air Base with folding stand (bag included for storage) is just the thing to take the stress off your back. Available from Slimline, it's well made and can be disassembled in minutes for transportation.



■ Airbase stand, \$89.99



RADIO CASES

A travel case to protect your expensive transmitter is a good investment. There are many to choose from, and they will keep your radio equipment safe and clean during storage and travel. Available in single- and dual-transmitter versions, they're must-haves for everyone.

■ Hangar 9 case, \$44.95 to \$54.99

■ Futaba dual transmitter, \$82.99

MIDWEST PRODUCTS

The Midwest Products model-support stand is sturdy and foldable, and it can support large, heavy models. The Aero-Stand is made of aluminum, and padded supports protect the model's finish. Stop bending over and straining your back!

■ Aero stand, \$111.99



WING TOTE INC. Keep your wings protected with custom-sewn wing bags from Wing Tote Inc. Made with a durable nylon outer shell and an inner closed-cell-foam padding with a heavy fleece lining, these storage bags pamper your wing panels as they've never been pampered before. They're available in several sizes.

■ Wing Tote, \$30 to \$130



ROBERT MFG. The lightweight and simple Super Transmitter Tray from Robert Mfg. supports your transmitter while you fly and has an adjustable neck strap. The tray can be assembled in seconds and has a metal J-bolt to lock the radio in place. It keeps the transmitter off the ground when you aren't flying, and two molded-in openings hold your favorite beverage can and glow-plug igniter. It's molded in white foam.

■ Super Transmitter Tray, \$24.95

ACE/THUNDER TIGER

The Carry Master from Ace/Thunder Tiger makes a compact, easy-to-carry package that stores everything you'll need for a great day at the flying field. It's available with fuel cell and case only or as a combo pack with everything you see here.

■ Carry Master, \$29.99

■ Combo pack, \$99.99



ELECTRIC STARTERS

Only the most hardboiled purists (who insist on always starting their engines by hand) would disagree that an electric starter is a wonderful accessory. Most engine starters come with alligator clips so you can attach the leads to a 12V battery, but you can also attach banana clips to the leads so you can plug them into your power panel. Most starters are direct-drive units, but some are geared or belt reduced to give more torque and starting power. Make sure that your helper holds your model firmly, as you have to push the starter cone onto the model's spinner with some force to prevent it from slipping. Place your power source in front of the model when you start the engine so the power cord doesn't get tangled in the propeller.



KAVAN

A very nice addition to the field box is this Kavan planetary-gear starter. An optional Ni-Cd power pack is also available; it eliminates the long power cord—just the thing for quick, convenient starts.

- Starter, \$41.90
- Ni-Cd holder, \$13.90
- 10-cell Ni-Cd pack, \$31



SULLIVAN

The mighty Sullivan Megatron electric starter is a two-fisted powerhouse for starting big, gasoline-powered engines. It features a double handle for secure starts, and it operates on 12V (600 oz.-in. of torque) or 24V (1,200 oz.-in. of torque), and it can start engines with displacements of up to 8ci (130cc). If your hand is worn out from starting those big gas burners, this is the answer!

- Megatron electric starter, \$267.48

FUEL MANAGEMENT

Fuel pumps range from simple mechanical hand-crank units and rubber squeeze bulbs to electrically powered and pressurized types. But the mission remains the same: to fill and empty the model's fuel tank. Whether you use gasoline or nitro fuel, several pump types and fuel containers are available. Always use a container with a screw-on cap; you don't want to spill fuel all over the inside of your car on the way to the field. To prevent your fuel lines and carburetor from becoming clogged, use a filter in your fuel can as well as an in-line filter in the delivery line for the fuel going to your model's tank. Also, use fuel line that is compatible with the type of fuel that you use.



SLIMLINE

Using items that are designed to work together helps simplify your field equipment setup and makes everything neater and easier to use. Several excellent fuel-management accessories are available from Slimline.

- Boxer pump, \$49.99
- Battery base \$49.99
- Pro Caps, \$16.99
- F1 Pro Cap glow bottle, \$18.99
- SL 2000 fuel pump, \$69.99
- M1 gas pump with container, \$48.99

ELECTRICAL EQUIPMENT

Power panels greatly simplify the wiring required to power other field accessories. They route 12 volts to the starter jacks as well as to the fuel pump jacks. The panel also supplies power to an adjustable output for energizing the glow-plug leads. Some panels have a meter to show the current powering the plug; other panels emit an audible tone to indicate positive continuity in the glow-plug circuit. Available from several sources and ranging in price from under \$20 to as much as \$75, a power panel is one accessory you should consider owning.

As already mentioned, energizing your glow plug can be done with leads from the power panel or by using a handheld glow starter. Typically, these units use either a rechargeable 1.2V Ni-Cd cell or a regular disposable 1.5V battery. Both types have an adapter that clamps onto the end of the glow plug and supplies it with enough power to start your engine. This is perhaps the most popular field accessory used by RC modelers.

V HANGAR 9 The power panel is the nerve center of any field box. It helps to manage all of the electrical equipment.

■ Deluxe power panel, \$22.95



A HOBIBICO For smaller field boxes, the MicroPanel Plus from Hobbico is just the ticket for your starting needs. Supplying 12 volts for a starter, the panel also supplies power for your glow-plug driver and has a recharging jack for your Ni-Cd-powered glow igniter. That's a lot of convenience for such a small package.

■ MicroPanel Plus, \$19.99



< DU-BRO A Du-Bro Glo-Plug Ignitor is a great addition to any flight box. Just slip in a disposable 1.5V battery, and you'll be set to go. They are available in short- and long-reach lengths.

■ Glo-Plug Ignitor, \$16.99 (short), \$17.99 (long)



A McDANIEL The ever popular McDaniel Ni-STARTER glow-plug igniter from Sonic-Tronics comes in several versions. It's available in 1½-, 2½- and 3½-inch lengths, with and without a current meter, and with or without a charger. Every field box needs at least one of these!

■ Ni-STARTER, \$17.95 to \$24.95



A SONIC-TRONICS The Super X and Mark X fuel pumps from Sonic-Tronics are equipped with high-performance centrifugal pumps to effortlessly fill and empty a model's tank. Pumps are available in 3.6 to 6V and 7.5 to 12V operating ranges. The new, solid-state Nifty gasoline pump has no electric motor to cause a spark!

■ Mark X, \$24.95
■ Super X, \$29.95
■ Nifty gasoline pump, \$79.95

V JM SERVICE Available from JM Service, the new Fast Fueler is specially designed to meet the needs of giant-scale modelers who operate gasoline engines. Designed by RC pattern pilot "Jersey Jim" Martin, the unit is made of aircraft-grade aluminum, is TIG-welded and has a 3-gallon capacity. The Fast Fueler is completely self-contained, and its high-volume air pump can deliver the fuel at roughly 25 ounces per minute. The unit comes with a 15psi pressure gauge and two stainless-steel valves to control fuel flow. The filler cap is O-ring sealed, and a large filter ensures that clean fuel is delivered to your model.



■ Fast Fueler, \$350



Battery Care

One item that's very important to take care of is your model's flight pack (receiver battery); without adequate voltage, your model's radio will not function properly. The best way to keep tabs on the flight pack is to check its voltage with a voltmeter, and the best unit to use is one that applies a current load to the battery while reading its voltage. Field chargers are also good to have so you can keep the pack charged during a long day's flying session. From simple set-it-and-forget-it chargers to adjustable multi-output units, there are many to choose from. Select one that's affordable and easy to use.



Hobbico The Hobbico Digital Voltmeter Mk III applies a 250mA load to your battery pack while it takes a reading. The display tells you whether it's OK to fly or it's time to recharge your 4-, 5- and 8-cell battery packs.

■ Digital Voltmeter Mk III, \$24.95



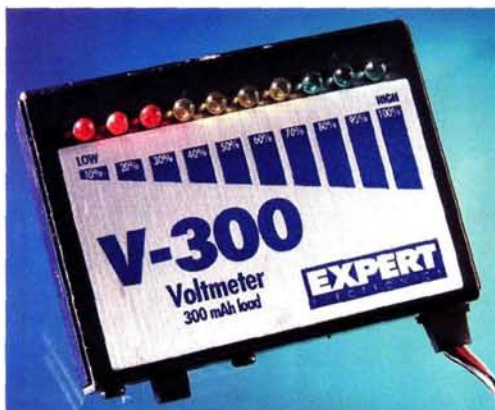
HITEC The CG-340 from Hitec RCD is an economical peak field charger that can charge most Ni-Cd battery packs. With an adjustable charge rate, it can charge a wide variety of transmitter and receiver battery packs as well as many smaller power packs. The output currents are suitable for both Ni-Cd and NiMH packs. The CG-340 is fully adjustable and easy to use.

■ RCD CG-340, \$39.99

FMA DIRECT

A DC field charger such as the FMA Direct SuperNova 250S is a great way to keep your radio's batteries happy. It does it all—Ni-Cd and NiMH! Make a few charge cords, and you can fly all day long!

■ SuperNova 250S, \$128.50



EXPERT ELECTRONICS With Expert's V300 Voltmeter, you'll know in seconds whether it's safe to fly or it's time to recharge. The multicolored LED indicators show the condition of your battery as the voltmeter applies a 300mA load to it. The unit is switch-selectable for 4- and 5-cell receiver packs.

■ V300 Voltmeter, \$15.95 +

Ace/Thunder Tiger (949) 833-0088; acehobby.com.

Du-Bro Products (800) 848-9411; dubro.com.

Expert Electronics; distributed by Horizon Hobby.

FMA Direct (800) 343-2934; finadirect.com.

Futaba Corp. of America; distributed by Great Planes; futaba-rc.com.

Great Planes Model Distributors Co. (800) 682-8948; greatplanes.com.

Hangar 9; distributed by Horizon Hobby.

Hitec RCD Inc. (858) 748-8440; hitecrd.com.

Hobbico; distributed by Great Planes; hobbico.com.

Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

JM Service (570) 296-7756.

JR; distributed by Horizon Hobby.

Kavan; distributed by Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.

McDaniels RC; distributed by Sonic-Tronics.

Micro Fasteners (800) 892-6917; microfasteners.com.

Midwest Products (800) 348-3497; midwestproducts.com.

Mini Hobby ATL Inc. (954) 746-3094.

Robart Mfg. (630) 584-7616; robart.com.

Slimline Mfg. (480) 967-5053; slimlineproducts.com.

Sonic-Tronics (215) 635-6520; sonictronics.com.

Sullivan Products (410) 732-3500; sullivanproducts.com.

The World Models Mfg. Co. Ltd.; distributed in the USA by AirBorne Models (925) 371-0922;

theworldmodels.com;

airborne-models.com.

Wing Tote Inc. (425) 251-5241; wingtote.com.

Model Tech

P-47D Thunderbolt





A great-looking, great-flying warbird

by Jim Onorato

Republic Aviation's P-47 Thunderbolt, affectionately nicknamed the "Jug," was one of the largest, fastest, most rugged and most heavily armed fighters of WW II. The fighter/bomber had eight 50-caliber machine guns plus rockets and bombs. It flew bomber escort missions over Europe and the jungles of Burma, and it escorted B-29s to Japan. Now, Model Tech has come up with a 1/7-scale reproduction of the big and beautiful P-47D.



The contents of the kit. Note that the fiberglass cowl and belly pan are painted, and the tail feathers are balsa-sheeted foam. The kit even includes a polished-aluminum prop hub.

SPECIFICATIONS

MODEL: P-47D Thunderbolt

MANUFACTURER: Model Tech

DISTRIBUTOR: Global Hobby Distributors

TYPE: sport-scale ARF warbird

WINGSPAN: 67 in.

WING AREA: 785 sq. in.

WEIGHT: 9 lb., 6 oz.

WING LOADING: 26.4 oz./sq. ft.

LENGTH: 55.5 in.

RADIO REQ'D: 5-channel with 6 servos (elevator, rudder, throttle, retracts, 2 aileron)

RADIO USED: JR XP8103 with five Cirrus CS-60 servos and one Cirrus CS-100 retract servo

ENGINE REQ'D: .61 to .91 2-stroke or .80 to 1.00 4-stroke

ENGINE USED: Magnum FS-91AR 4-stroke

PROP USED: 14x8 Master Airscrew

FUEL USED: 15% Red Max

LIST PRICE: \$229

FEATURES: balsa and lite-ply sheeted fuselage; built-up wing with two aileron servos; balsa-sheeted, airfoil-shaped tail feathers; airframe covered in silver, black and olive drab iron-on, heat-shrink film; painted-fiberglass cowl and fiberglass belly pan; molded-plastic wing fairings and machine-gun fairings; clear molded canopy; fixed or retractable landing gear (both included); photo-illustrated assembly instructions; all necessary hardware; polished-aluminum spinner hub.

COMMENTS: this is a well-made ARF warbird with many true-to-scale features. The Thunderbolt has a low wing loading that makes it a joy to fly. With the addition of a few details, the Jug could be a serious contender in club-level scale contests.

HITS

- Excellent flight performance and low-speed stability.
- High-quality workmanship and materials.
- Excellent assembly instructions.
- Great overall appearance.

MISSES

- None.

WHAT'S IN THE BOX?

When I opened the box, I first noticed how great the covering looked; it was smooth and tight. If yours has wrinkles in the covering, use an iron set to medium heat to smooth them out (at this heat, it won't melt the covering). As I inspected the various components, I could see that the kit was of high quality and that the overall appearance and quality of workmanship was top-notch.

The P-47D features a fully sheeted fuselage that's made of balsa and lite-ply and has a true-to-scale, built-up elliptical wing. The foam-core, airfoil-shaped tail feathers are also balsa sheeted. The kit includes a beautiful factory-painted fiberglass cowl, a fiberglass belly pan, an engine mount, fixed and retractable landing gear, wheels, a fuel tank, clear molded canopy, plastic wing fairings, machine-gun fairings and wheel-well cups plus all the necessary hardware and decals. You need to supply a 4- or 5-channel radio, an engine, a propeller and fuel tubing. The kit even includes a beautifully polished aluminum spinner hub that's custom made for this aircraft.

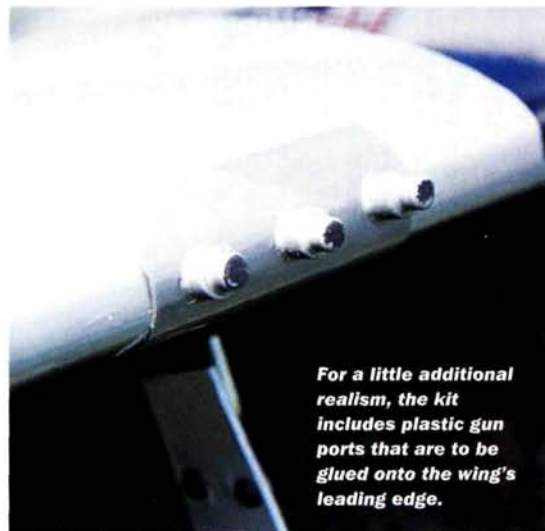
The 68-page instruction book includes more than 110 photos and drawings to guide you through assembly. The instructions are very well written and contain a list of the kit's contents as well as a list of the additional items, tools and supplies needed to

complete assembly; nothing was overlooked.

ASSEMBLY

Wing. After reading the instructions, I realized that the assembly sequence was not critical, so I decided to deviate from the instructions somewhat and to assemble the wing first. A plywood dihedral brace that slides into pockets in the wing panels is used to join them. One of the panels has a hardwood dowel in the root rib that mates with a hole in the opposite root rib for perfect alignment—a nice touch! After making sure that everything fit correctly, I glued the panels together with 30-minute epoxy.

The provided CA hinges for the control surfaces are only $\frac{3}{4}$ inch square. I didn't think this provided a sufficiently large gluing surface, so I replaced the hinges with larger $\frac{3}{4}$ x1-inch hinges; it's better to be safe than sorry, and this model is too beautiful to risk damaging it in flight. I installed a Cirrus CS-60 aileron servo in each wing panel; they're attached to hardwood blocks



For a little additional realism, the kit includes plastic gun ports that are to be glued onto the wing's leading edge.

that are epoxied to the servo hatches. I hooked up the servos to the ailerons with the provided hardware. Two 12-inch servo extensions are needed to extend the servo leads to the center of the wing. Paper tubes installed in the wing make this a simple task.

The retracts are installed next. The mounting rails are already installed, and the cutouts for the wheels and struts have been made for you. I had only to remove the covering from the cutouts, bend the pushrods to shape and bolt the retracts into place. The instructions include a photo that shows

The control throws recommended for the Thunderbolt are very modest, and Model Tech warns against using more throw than suggested. I set the low control throws as recommended for test flying and used high rates for sport flying.

TAKEOFF AND LANDING

With the P-47D's small wheels and landing-gear covers, I was concerned that it would not handle well on a grass runway, and my concern turned out to be well founded. The Jug has a tendency to nose over in thick grass. For takeoffs from grass, I apply full up-elevator, hold the tail, run up the engine, and then let the model go. Once the model starts to roll, it tracks beautifully without any need for rudder input. I gradually reduce the elevator to neutral and when flying speed has been attained, I apply just a touch of up-elevator; the P-47D lifts smoothly with hardly any rotation. This plane wouldn't have any problem taking off from a hard surface.

The P-47D has a shallow glide that makes landings a real pleasure. I set up a long approach and throttle down to establish the rate of descent while using slight up-elevator to reduce its speed. I let the Jug continue to descend at low power until just before touchdown. I then reduce power to idle and let it settle onto its main gear. If you flare too much or try to make a 3-point landing, the plane may balloon upward or stall. It's easier and more scale-like to do a wheel landing. Occasionally, if I don't get the tail down quickly enough, the model's nose will kiss the grass, but it has never yet flipped over.

LOW-SPEED PERFORMANCE

The model's moderate wing loading makes it a smooth, predictable flyer at slow speeds. I didn't notice any reduction in control response at part-throttle settings. Induced stalls are gentle and almost straight ahead. Recovery is immediate as soon as power is applied. This P-47D flies in a very scale-like manner at about $\frac{3}{4}$ throttle.

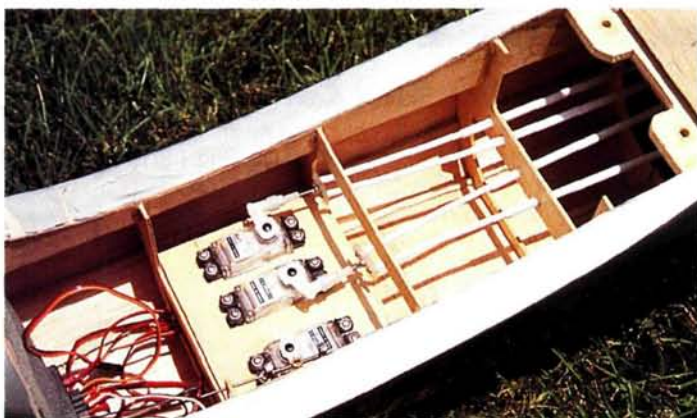
HIGH-SPEED PERFORMANCE

When powered by the Magnum FS-91AR engine, the P-47D flies quite fast, especially with the gear up. It tracks well and is very stable at high speed. At full throttle and when using the recommended control throws, it doesn't show any bad tendencies.

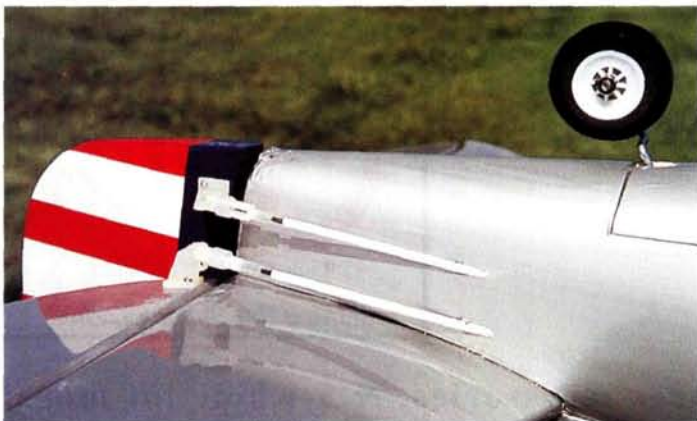
AEROBATICS

The Thunderbolt was not designed for aerobatics, but it is capable of scale maneuvers such as loops, rolls and spins. Rolls are quite slow, even at the recommended high control rate, and they require elevator input to keep them axial. Down-elevator is required to maintain altitude during inverted flight. I particularly liked doing huge round loops, slow victory rolls and low, high-speed strafing runs across the flying field.

If you are accomplished at flying low-wing sport airplanes, you'll have no trouble putting the Jug through its paces.



Above: no lack of room here! The servo tray is die-cut and accommodates standard servos. Note the clever dual-pushrod hookups. A single rod is attached to a nylon plate; the pushrods are then screwed to the plate. Simple and easy! Below: the rudder and tailwheel are controlled by two pushrods that are attached to the same servo. The elevators also use two pushrods; I assembled them using the supplied hardware.



how to bend the pushrods to get the proper clearance for smooth operation—another nice touch. To operate the retracts, I used a Cirrus CS-100 retract servo. For modelers who have 4-channel radios, the kit includes hardware for fixed landing gear and a rather clever mounting block that you bolt right onto the retract mounting rails. With the installation of the molded-plastic wheel wells and the landing-gear covers, the wing is complete.

Fuselage. Instead of using the provided 5mm machine screws, I attached the wing to the fuselage with $\frac{1}{4}$ -20 nylon bolts threaded into the plywood wing-mounting block. I did this because I didn't have a 5mm tap, and I thought the larger nylon bolts would be stronger. I removed the covering from the underside of the wing where the fiberglass belly pan is located and then epoxied it into place.

I glued on the fin and stabi-

lizer with 30-minute epoxy and then hinged the rudder and elevators. As with the ailerons, I used the longer CA hinges instead of the shorter ones provided. The rudder is covered in red and white stripes with a black vertical stripe at the hinge line. I removed the black stripe and replaced it with an Insignia Blue one. The tailwheel on the P-47D is in a scale location and is controlled by a separate pushrod from the rudder servo. The tailwheel assembly is attached by screwing four cap-screws into blind nuts that are already installed in a rear former. A removable hatch allows easy access.

I installed the die-cut servo tray on the support rails inside the fuselage and positioned the two closest servo cutouts toward the left side of the fuselage. I then installed three Cirrus CS-60 servos and assembled the pushrods (two for the elevators and two for the rudder/tailwheel) using the provided hardware.

Big, tough and capable

She was big. She was portly. But she was unbelievably deadly and a surprisingly good dance partner. Those who knew her well loved the Thunderbolt and saw her in a completely different light from those who didn't, because, among other things, it was surprisingly light on the controls and probably the easier fighter of WW II to land. The pilots who strapped in behind that big Pratt & Whitney R-2800 and rode it into combat knew that the Thunderbolt would take care of them. It could take it as well as it could give it, and more badly damaged Thunderbolts brought their pilots home than any other single engine fighter.

Those who look down their noses and smirk at the blunt form of the Jug are ignoring the facts: most references credit the rotund Jug with having knocked 3,752 supposedly much more agile enemy aircraft out of the air. More important, only 0.7 percent of the Jugs that left on a combat mission didn't return.

The most heavily armed fighter in the American arsenal, the Thunderbolt came into its own as a ground-pounder and, because of this, it flew more than twice as many sorties as the Mustang. When its eight .50-caliber Brownings (which put 30 pounds of lead into the target in a 3-second burst) were combined with rockets and bombs, the Jug was a fierce ground-attack machine. In the ETO alone, between



D-Day and VE day, it is credited with the destruction of 9,000 locomotives and 86,000 rail cars.

Unfortunately, the survival rate of P-47s into modern times is among the lowest of any American fighter. In recent years, however, a small handful have been recovered from South America, where they last served as front-line fighters. This P-47D-40 (above), restored by Bill Klaers and Alan Wojciak of Klaers Aviation in Rialto, CA, is one of those from far south of the border. Klaers Aviation's veritable Thunderbolt "production line" is taking corroded and battered hulks and returning them to the air, where they belong. —Budd Davisson



Above: the Magnum FS-91AR 4-stroke engine is a perfect match for the Thunderbolt and fits completely inside the cowl. Below: the large cowl will enclose just about any engine in the recommended range. The included polished-aluminum prop hub sure looks great!

I was now ready to install the engine and fuel tank. I used a Magnum FS-91AR 4-stroke engine and mounted it inverted. The engine mount is attached to the firewall with four 4x30mm bolts and blind nuts. I then assembled and installed the fuel tank and fiberglass cowl, which is beautifully painted and large enough to enclose the engine. With the engine mounted inverted, the muffler sticks out of the lower left side of the cowl and points downward. The cowl is held in place with four wood screws and hardwood blocks that are epoxied to the firewall. Be sure to sand the clear finish off the firewall where the blocks go, or they may break loose. I used a 14x8 Master Airscrew nylon prop and the polished-aluminum spinner hub that came with the kit.

Final assembly. I trimmed the molded-plastic wing fairings and attached them to the top of the wing with thin CA; they fit very well and give the Thunderbolt a neat look. I then attached the gun fairings to the wing's leading edge with thin CA, and I added a 1/7-scale Williams Bros. pilot figure. I painted the canopy framework olive drab and attached it to the fuselage with six small screws.

I wrapped the receiver and battery in foam and installed them as far forward as they would go. I still had to add about 8 ounces of lead to the firewall to get the center of gravity to come out where indicated. The final steps were

the addition of the nylon antenna to the top of the fuselage and the application of the decals.

CONCLUSION

The Model Tech P-47D Thunderbolt is a well-engineered ARF that goes together easily and has great scale appearance when completed. I thoroughly enjoyed building and flying it, and I highly recommend it for anyone who has experi-

ence flying a 4-channel, aileron-equipped model. If you've always wanted a warbird but don't have the time to build one, this Jug is hard to beat! ✈



The P-47D is an impressive model that captures the imaginations of pilots and spectators whenever I fly it.

Cirrus; distributed by Global Hobby Distributors. Global Hobby Distributors (714) 963-0133; globalhobby.com.

JR; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

Magnum Engines; distributed by Global Hobby Distributors.

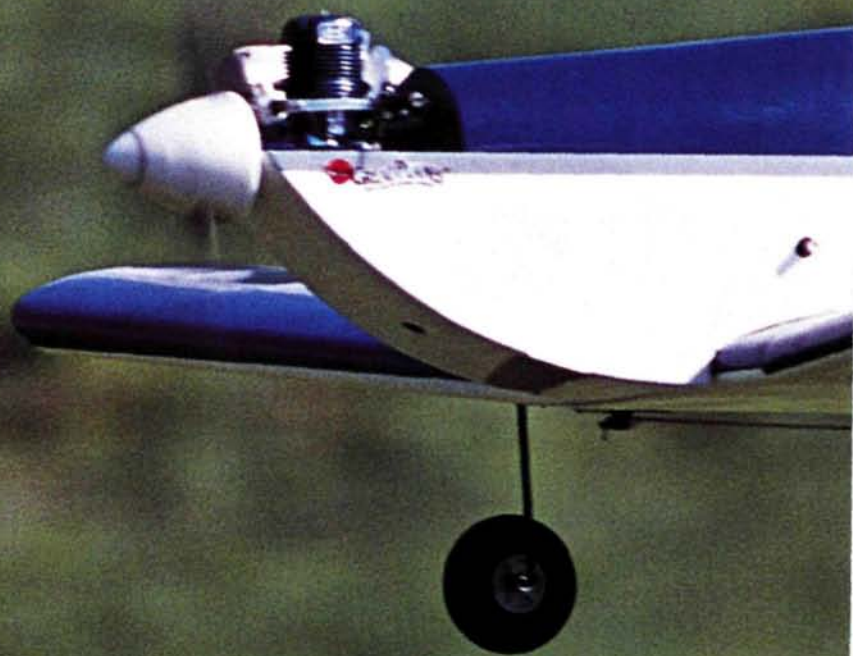
Master Airscrew; distributed by Windsor Propeller Co. (916) 631-8385; masterairscrew.com.

Model Tech; distributed by Global Hobby.

Red Max (800) 742-8484; member.aol.com/fhssoil/RedMax.html.

Williams Bros. (805) 534-1307; williamsbrosinc.com.





Great Planes

SlowPoke Sport .40 ARF

Slow and easy have never been this much fun

by Rodney Roy

The Great Planes SlowPoke ARF is reminiscent of the racers and homebuilt airplanes that flourished during the Golden Age of flight. It's a fun-flying airplane and, as its name implies, it can fly really slowly and "poke" around, thanks to its large wing and high-lift, flat-bottom airfoil. It is quite different from the current crop of boxy-fuselage and straight-wing airplanes, and this gives it a real advantage in charm and good looks.



SPECIFICATIONS

MODEL: SlowPoke Sport .40 ARF

MANUFACTURER: Great Planes
Model Mfg. Co.

TYPE: .40-size low-wing sport ARF

LENGTH: 49 in.

WINGSPAN: 61.5 in.

WING AREA: 1,076 sq. in.

WEIGHT: 7 lb., 3 oz.

WING LOADING: 15.39 oz./sq. ft.

ENGINE REQ'D: .32 to .46 2-stroke or
.40 to .52 4-stroke

ENGINE USED: O.S. .46 LA

PROP USED: 11x6 APC

FUEL USED: Cool Power 15% nitro

RADIO REQ'D: 4-channel w/5 servos

RADIO USED: Futaba 9C

PRICE: \$149.99

FEATURES: all-wood ARF comes covered with Top Flite MonoKote in four colors; hardware package and illustrated instruction manual included; build time: 10 to 15 hours; dual aileron servos; a large wing area; a low-wing, flat-bottom airfoil.

COMMENTS: the Great Planes SlowPoke is a high-quality, easy-to-build ARF. I thoroughly enjoyed building and flying this Golden Age airplane and highly recommend it to sport fliers who want something different.

HITS

- Great overall appearance.
- High-quality construction and covering.
- Very entertaining to fly.

MISSSES

- Loose fit of the dihedral brace in the wing panels.
- Minor steps omitted from instructions.



WHAT'S IN THE BOX

There is no doubt in my mind that ARFs have come a long way. On opening the box, I saw that the SlowPoke had been carefully packed and protected. The model is built of balsa and ply and comes covered in MonoKote. It comes with nearly everything you'll need to complete it, except for the radio, an engine and a propeller. Included are the fuel tank, a generous hardware supply, wheels and a tailwheel assembly, plus the pushrods and a spinner. The instruction booklet is very well written and has lots of detailed photos and diagrams that cover all assembly stages.

ASSEMBLY

Before I assemble an ARF, one of the first things I do is reshrink the covering. It's practically a requirement for most ARFs because of all the temperature changes they go through during shipping.

I started assembly with the wing. After I had assembled the dihedral braces with Great Planes 30-minute epoxy, I test-fit the wing panels to the center section. My dihedral brace was a little loose in the wing slots, but I figured that epoxy would take care of this. If I did it over again, I would probably add a piece of balsa to the dihedral brace as filler.

Each aileron is controlled by its own servo, and there are cutouts in each wing panel for the servos. I cut out the covering over the holes in the wing panels and the center section. Great Planes has thoughtfully placed string in the wing to allow the servo wiring to be pulled through. I needed to use two 6-inch extensions plus a Y-harness to reach the receiver. Next, I used



The major components come nicely covered in MonoKote, and the construction is first-rate. Nearly everything is included except radio gear, an engine and a propeller.

some 30-minute epoxy to join everything. When the wing was all set, I trial-fit it to the fuselage, and it lined up perfectly; the mounting holes for the wing hold-down bolts lined up with the blind nuts in the fuselage. I then removed some covering where the hold-down plate was to go and glued it into place with 30-minute epoxy.

The next step is to attach the ailerons with the supplied CA hinge material. The slots for the hinges have already been cut in the wing and ailerons. I like to run a $\frac{3}{32}$ -inch-diameter drill bit in the center of the slots to allow the CA glue to better flow onto the hinges. I then mounted the servos in the wing panels, followed by the control horns. Here, I deviated from the instructions a little bit. The instructions tell you to measure 1 inch from the aileron edge and center the control horn on this mark. I didn't feel the control rod

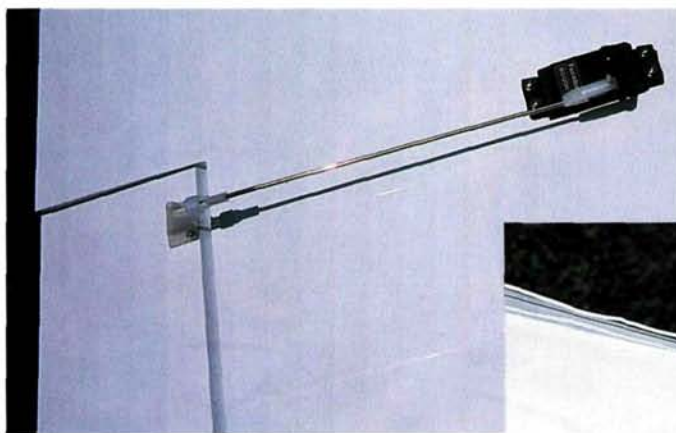
the control horns are mounted. The instructions tell you to remove a bit of the covering, make a few pinholes and saturate these with thin CA. You are told to then mount the horns with no. 2 sheet-metal screws. I replaced the screws with some longer 2-56 screws so they would go all the way through the ailerons into a nylon backing plate. Then, I mounted the landing gear on the wing with the supplied hardware and secured the wheels.

TAIL ASSEMBLY

The instructions tell you to cut the covering in the fuselage and then slide the stabilizer into the slot from the side. To make gluing the stabilizer easier, I removed a portion of the tail post and glued it back into place when the stabilizer was secure. I then hinged the elevators after I fit the elevator-joiner wire. Next, I slipped the vertical fin into the slot in the fuselage after I trimmed some of the covering away for a secure glue joint. The instructions don't tell you to drill a hole in the rudder for the tailwheel assembly, so don't forget this important step before you mount the rudder.

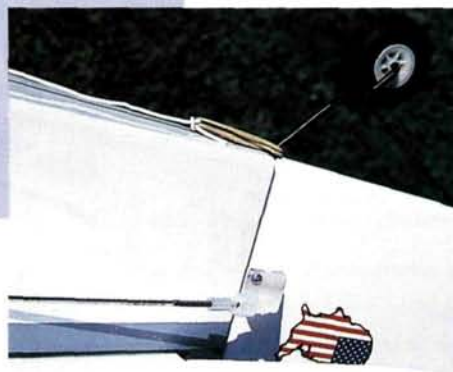
FUSELAGE AND RADIO

I assembled the supplied fuel tank as instructed and then wrapped it in foam rubber and slid it into the tank compartment—a tight fit. The engine is mounted on a built-in plate in the nose of the fuselage, and I needed to enlarge it slightly for the O.S. .46 LA I use. If you use a .40 engine, it will drop right in. I used a Great Planes Dead Center engine-mounting-hole locator to mark the positions of the mounting holes for the engine. To fuel-proof and dress up the nose of the model, I painted it with matching blue and gray LustreKote paint.



Above: Each aileron is controlled by its own servo. The cutouts are formed for you, but you'll need to trim the covering back to install the servos. String inside the wing makes it a snap to pull the servo leads through. Right: the steerable tailwheel assembly is included in the kit and is easy to install. You must remember to drill a hole in the rudder for it, though, because the instructions don't mention this step.

would travel straight, so I moved the control horn over slightly so the rod would make a straight run from the servo. The other thing I changed was the way





I flew the SlowPoke the first time in 10 to 15mph winds. Even so, its performance was awesome! This plane is a blast to fly; in fact, a few of my fellow club members who were watching decided on the spot that they had to have one.

TAKEOFF AND LANDING

After performing the routine preflight checks, I taxied the SlowPoke onto the runway, facing a pretty gusty wind. I slowly applied power; the tail came up in about 25 feet at a little over $\frac{1}{2}$ throttle. With a very light touch of right rudder and a little up-elevator, the SlowPoke seemed to levitate right off the ground in about 40 feet.

Landings are so gentle that it felt as though the airplane were landing itself. All that is required is to line up with the runway, reduce power and keep the wings level; the SlowPoke settles into a beautiful 3-point landing. Into a headwind, the plane just seems to hover, so I cut the power, and the plane settles down gently.

LOW-SPEED PERFORMANCE

As its name implies, this is where the airplane excels. I took it up a couple of mistakes high, faced it into the wind and reduced power while feeding in up-elevator. The plane slowed to a crawl and began to

hover and then continued to fly. Simply put, this airplane will not stall.

HIGH-SPEED PERFORMANCE

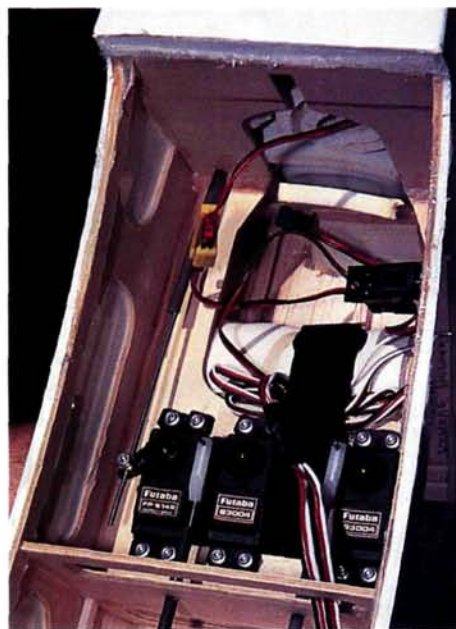
This is not a high-speed airplane; just looking at the chord and design will tell you that. With a suitable powerplant, however, it will produce a respectable speed—certainly more than its name implies.

AEROBATICS

The SlowPoke isn't an aerobatic airplane, but it will do mild aerobatics when pushed. Loops are smooth and require no additional power. Rolls require aileron/elevator coordination. I tried to spin a number of times and succeeded only in doing a slow spiral, which straightened itself out when I released the sticks. Hammerheads are something else, though; with that large rudder, I could go straight up, kick over the rudder and take the same line down.

The nicest thing about this airplane is that things happen slowly, so there is plenty of time to react during any maneuver.

There is ample room in the fuselage to install the radio gear, and I used Futaba S3004 servos for the elevator and rudder and a Futaba S148 servo for the throttle. I then assembled the pushrods and slid



Above: there is plenty of room in the fuselage for radio gear. I installed $\frac{1}{8}$ -inch lite-ply under the servos to relieve a slight binding when the control rods were attached. Right: the O.S. .46 LA engine has plenty of power, and its blue finish complements the SlowPoke's look. The mounting-plate hole had to be enlarged slightly, but a standard .40 engine would drop right in.

them into the installed guide tubes. At this point, I found a slight problem: the pushrods were binding slightly in the guide tubes when they were mounted on the servos. I added a piece of $\frac{1}{8}$ -inch lite-ply under the servos to raise them slightly, and this solved the problem. The throttle linkage is attached to the servo with a screw-lock connector. I drilled a small hole just behind the wing, inserted a piece of fuel tubing and routed the receiver antenna out of the fuselage.

FINISHING TOUCHES

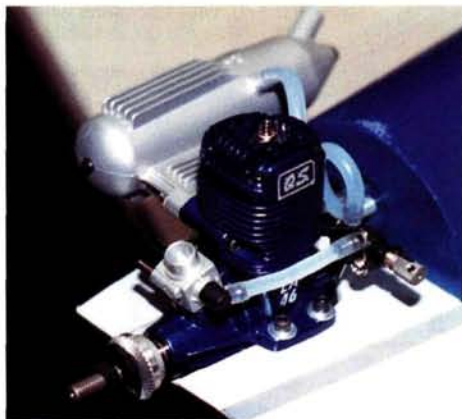
All that was left to do was to balance the airplane and set the control throws. Using a Great Planes CG Machine, I found the SlowPoke to be tail-heavy. I moved the battery to the fuel-tank compartment and had to add 6½ ounces of lead to balance the

plane. If you use a 4-stroke engine, most—if not all—of the lead can be removed.

I set up the control throws as recommended and applied the decals. I also added a pilot figure and fabricated an instrument panel from some scrap material that I had on hand. I attached the windshield to the fuselage, although there is no mention of this in the instructions. I also added some cockpit coaming and a piece of piping around the windshield to enhance the cockpit's looks.

CONCLUSION

The Great Planes SlowPoke is a great-looking model that requires little effort to assemble. It is well constructed; all of the glue joints are tight, and the factory-applied covering is expertly done. The SlowPoke looks great on the ground as well as in the air. If you're after that nostalgic look, then I recommended the SlowPoke; I think you'll like it as much as I do. ✚



APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.
Cool Power; distributed by Morgan Fuels (800) 633-7556; morganfuel.com.
Futaba Corp. of America; distributed by Great Planes; futaba-rc.com.
Great Planes Model Distributors Co. (800) 682-8948; greatplanes.com.
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Hangar 9 Clipped-wing Taylorcraft



by Stan Kulesa

Back during the early '60s, the clipped-wing Taylorcraft (nicknamed the "T-Craft") represented state-of-the-art aerobatics; in fact, Margaret Ritchie won the National Aerobatics Advanced class title in 1961 with a modified Taylorcraft (and I'll bet some of you thought Patty Wagstaff was the first female aerobatic superstar pilot). Hangar 9's clipped-wing Taylorcraft is a beautiful rendition of a full-scale airplane built by restoration expert Jim Moss.

With its UltraCote-covered, built-up wooden wing and fuselage, detailed fiberglass cowl, custom pilot seat and beautiful trim scheme, this model is guaranteed to impress.

THE KIT

The kit box is very large, and each major piece is bagged in clear plastic. Everything was easy to identify, and the parts were well-packed; there wasn't any shipping damage. The kit doesn't come with blueprints, as none are needed. The 54-page instruction manual is excellent; it's easy to read and well laid out, and the picture quality is well above average. It also offers tips on the parts, tools and supplies needed for each step and recommends balance and safety procedures. Oddly, it doesn't include comments on the model's flight characteristics, although extensive information on preflight preparation is provided. Details include painted-fiberglass wheel pants, painted-aluminum landing gear wing struts, decals, lightweight wheels, an 18-ounce fuel tank and a complete hardware package.



Majestic, one-of-a-kind aerobat



PHOTOS BY STAN KULESA AND WALTER SUDAS

CONSTRUCTION

• **Wing.** Construction is fairly typical of almost-ready-to-fly (ARF) planes and begins with attaching the ailerons to the wing. CA-type hinges are included, and each aileron uses four. I was pleased to find that all of the hinge slots had been cut. After cutting away the covering, I installed the aileron servos into pockets in each panel. You'll need an 18-inch servo extension for each aileron, and if you don't have a computer radio, you'll also need a Y-harness.

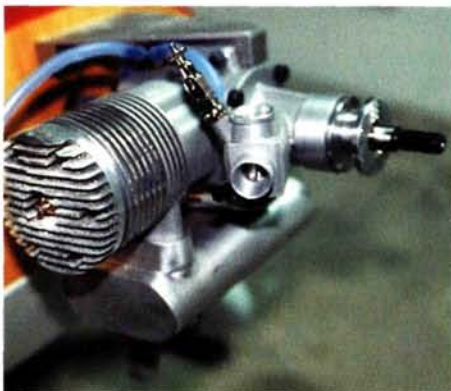
Each wing panel has 10 full ribs with the root ribs made of plywood. The ribs beyond the sheeted center section are capstripped, and the spars have shear webs. This makes the wing very solid; there wasn't any movement when I twisted the panels. A massive, one-piece plywood joiner permanently joins the wing halves, and it fits into plywood channels along the main spars in each wing

panel. The trailing edge is a butt joint. The wing-half-joining process does not call for any additional reinforcement, although the $\frac{1}{8}$ -inch plywood wing-bolt plate on the top aft center section of the wing does add some strength. I used 30-minute Z-Poxy to join the wing halves because I wanted to have enough time to properly align them. Be sure to have some denatured alcohol handy so you'll be able to wipe away any excess epoxy that oozes from the joint. In addition to the struts, two dowels in the leading edge and two nylon screws on the trailing edge hold the wing in place on the fuselage.

• **Fuselage assembly.** The fuselage is an $\frac{1}{8}$ -inch plywood frame with five formers. To give the fuselage its shape, $\frac{1}{8}$ x $\frac{1}{8}$ -inch hardwood strips run fore to aft from the firewall. The cabin section is sheeted with $\frac{3}{32}$ -inch balsa.



Left: there's plenty of room in the fuselage for the radio components. The receiver is wrapped in foam and then rubber-banded to the tray. I painted the interior white. The seat is held in place with hook-and-loop fastener. Below: the Moki 1.35 and Bisson Pitts-style muffler are a good combination for this model. They fit neatly into the cowl, which requires minimum trimming.



The cockpit area has a lot of glass, and a full-body pilot figure is recommended to dress it up; I used this figure from Pilots By Diane. It looks great in the pilot's seat.

To attach the stabilizer and fin to the fuselage, I used 5-minute Z-Poxy. Do not attach the stabilizer or fin with CA; only epoxy can give the solid surface-to-surface bond needed by a giant-scale model. Six metal braces further stiffen the empennage. The manual does a good job of explaining how to align the stabilizer properly.

The rudder and elevator frames are made of 1/2-inch balsa with 1/4x1/4-inch balsa ribs, and the stabilizer and fin are sheeted with balsa. Six hinges attach the elevators to the stabilizer, and four hinges are used on the rudder. A shock-absorbing tailwheel assembly is mounted in the aft end of the fuselage.

The one-piece aluminum landing gear is painted white, and it's attached with four screws to an 1/8-inch plywood plate on the bottom of the fuselage. Installing the wheels and axle in the one-piece fiberglass wheel pants proved to be difficult. I cracked both wheel pants when I spread them open to insert the wheels and axles. To repair them, I covered the cracks with fiberglass cloth and CA. Two lengths of threaded wire with clevises are mounted on the underside of the landing gear to provide shock mounting.

The cowl is attached with four screws to two hardwood flanges on the front sides of the firewall. To absorb the engine vibration, Hangar 9 provides four small rubber grommets for the screw holes in the cowl. I made small holes in the cowl to accommodate the glow plug, the needle valve and the remote fueling valve. Since I

MOKI MUSCLE

Moki 2-stroke engines have a reputation for unmatched quality and performance, and the 1.35 doesn't disappoint. The engine is very smooth at all throttle settings, and the transition from idle to full power is exceptional. The owners' manual is well thought out, and information is presented in a logical order. It covers break-in, frequently asked questions and safety tips and offers a mounting template. A muffler must be purchased separately; a wide variety of Bisson mufflers is available for upright, horizontal and inverted installations. Like all Moki engines, the 1.35 comes with a one-year warranty.

Be sure to take the time to properly break in the engine. It has a hard chrome cylinder that requires a longer break-in. Also make sure that your fuel contains some castor oil; Moki does not recommend that you run its engines on synthetic-oil fuels. I used Cool Power 15-percent nitro (I added several ounces of castor oil to the fuel) and a Zinger 16x10 prop for the initial break-in. Before I started the engine, I primed it by pulling the prop through a few times, and the engine started at a 1/4-throttle setting. I don't need a glow driver to keep the engine running, although it may be useful if you mount the engine inverted. After running the engine for about an hour and burning a gallon of fuel, it held a steady 8,900rpm at full throttle and a low 2,100rpm for idle. I felt that the engine was ready for some test-flying. The instruction manual states that it takes approximately five hours of running time to completely break in the engine.

Moki recommends low-nitro or no-nitro content for its engines, so I switched to Cool Power 5-percent nitro for all flying, and I paired this with a Zinger 16x8 propeller. With the lower-pitch prop, the engine's peak rpm was between 9,300 and 9,500 with excellent throttle transition. Fuel consumption is about 1.5 ounces per minute at full throttle; this is a little on the high side, but that's the price you pay for the power this engine produces.

The Moki 1.35 is a great product—simple, reliable and user-friendly. With its smooth power and great throttle response, it gives the Hangar 9 Taylorcraft a nice feel.



SPECIFICATIONS

Model: Moki 1.35	Weight: 30.2 oz.
Bore: 31.5mm	Rpm: 2,000 to 10,000
Stroke: 29mm	Hp: 3.45
Displacement: 1.35ci	Price: \$289.95

TAKEOFF AND LANDING

Ground handling is excellent! As I power up for takeoff, very little right rudder is needed to stay on the straight and narrow. The tail comes off the ground in about 20 feet, and the model lifts off with slight up-elevator at $\frac{1}{2}$ throttle. The climb-out is incredibly solid at about a 20-degree incline. Landing the T-Craft is enjoyable. Because it tracks so solidly, you need only line it up with the end of the runway and let gravity do its job. The model settles at just under $\frac{3}{4}$ throttle, and on touching the ground, the tail remains up until most of the speed has bled off. It lands true to scale.

LOW-SPEED PERFORMANCE

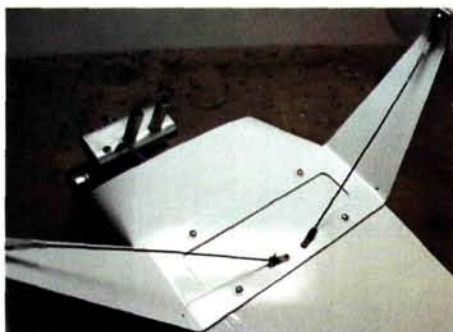
At slow speeds, the large ailerons remain extremely responsive, as does the elevator. When the T-Craft stalls, it's anticlimactic; the plane just mushes along until its nose drops. Adding power quickly has the model flying again. Just tooling around the sky at low throttle settings is very relaxing.

HIGH-SPEED PERFORMANCE

Since it's a high-wing airplane, it isn't meant to fly at bullet speeds. The very wide wing chord, V-struts and tail bracing create a fair amount of drag. The model handles very well at high speeds, though; no trim changes are needed between low and high speeds.

**AEROBATICS**

This is what the T-Craft was designed to do! Its aerobatic heritage is quite evident. Rolls are very true and axial. With the recommended high rates, the model completes one roll per second at full aileron deflection. Snap rolls are graceful and gentle. With the Moki 1.35 up front, vertical maneuvers are noteworthy; loops measuring 100 feet in diameter remained on track, and outside loops were tighter in diameter (about 50 feet). Immelmann turns are crisp, while knife-edge flight is equally solid from the left and the right. Inverted flight requires a little down-elevator. Spins are brisk but not snappy, while inverted spins are very gentle. The T-Craft tracks solidly, regardless of crosswind conditions.



Two threaded lengths of wire are attached to the underside of the landing gear. They provide some shock absorption for hard landings.

use a Bisson Pitts-style muffler, I didn't need to cut away too much of the cowl for the exhaust exit. This muffler is a big plus in maintaining the model's good looks and scale appearance.

• **Radio installation.** Five servos are needed for this model (one for each aileron, and one each for the elevator, throttle and rudder), and radio installation is fairly easy. I used an Airtronics RD6000 Super radio and Airtronics 94358 heavy-duty servos on the ailerons, elevator and rudder. I used a standard servo for the throttle.

An $\frac{1}{8}$ -inch plywood tray is provided for the rudder, elevator and throttle servos; the elevator servo sits a bit higher than the other servos to eliminate the chance of interference between the rudder and elevator pushrods. To shock-mount the receiver, I wrapped it in foam and "rubber-banded" it to the servo tray. The battery pack sits under the fuel tank in its own

compartment. To avoid detracting from the model's looks, I ran the receiver antenna through a tube inside the fuselage.

The elevator pushrod is a $19\frac{3}{4}$ -inch length of hardwood with two 12-inch threaded rods attached at one end to form a Y. The rudder uses 0.020-inch-diameter music wire for a pull/pull system; a Nyrod pushrod controls the throttle. The manual clearly specifies the amount of control throw needed for each flying surface, and I followed its recommendations and enjoyed excellent flights. I needed to add 11 ounces of weight to the nose to get the model



The vertical fin has an extended hardwood post that fits tightly into the aft end of the fuselage for proper alignment. Be sure to remove the covering from it before you glue the fin into place.

to balance. If you use a heavier engine, such as the Saito 1.80 or Zenoah G-23 instead of the lightweight Moki, no additional nose weight will be needed.

• **Engine.** The Taylorcraft can use a variety of engines; I used the powerful Moki 1.35 2-stroke engine swinging a Zinger 16x8 propeller. The Moki 1.35 is an excellent choice for this model; it provides the power I want for vertical performance. A 2-inch-diameter spinner is provided, but it can't be used with a large prop, so I used a Goldberg $2\frac{1}{2}$ -inch diameter spinner.

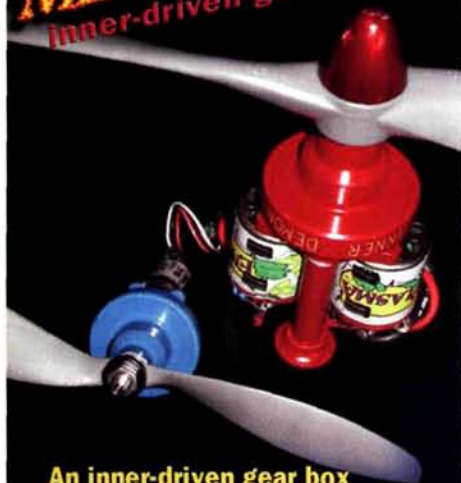
Before I installed the engine, I applied a thin coat of 5-minute Z-Poxy to the firewall for fuelproofing and, for convenience, I used a Hangar 9 remote fueling valve. I also replaced all the metric screws with 6-32 socket-head bolts and nuts. The toughest part of the engine installation was reaching through the upper nose section of the fuselage to attach the blind nuts. Long forceps came in very handy for this.

• **Finishing.** Some of the seams on the covering were a little loose; a few minutes with a covering iron took care of this problem. The covering job is quite impressive, and there weren't any ripples in the trim. I was pleased to find that wherever there was an overlay of covering, the bottom layer was peppered with holes so no air would be trapped. The colors on the painted fiberglass cowl match the UltraCote colors.

Now add the wing struts. They are covered in UltraCote, have adjustable metal brackets on both ends and are attached to the upper landing gear and to the wing with screws. One of the struts had a slight

INNER DEMON and MINI DEMON

inner-driven gear drives



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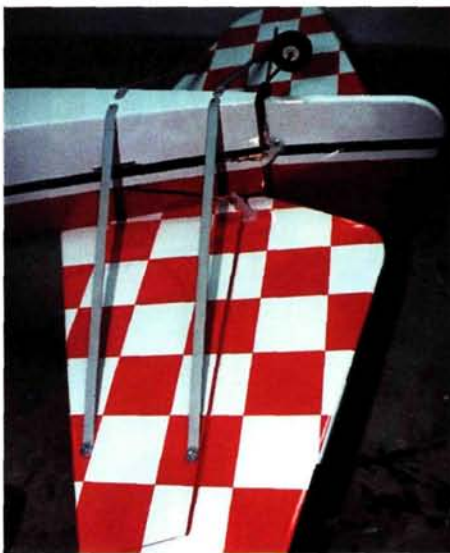
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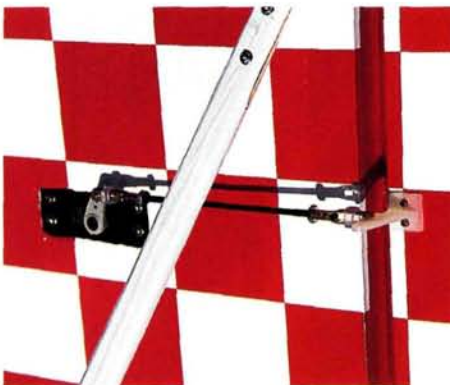
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HANGAR 9 TAYLORCRAFT



Just like the full-scale aircraft, the model uses six braces to strengthen the tail feathers.



The aileron servos are recessed slightly in each wing panel. You just need to cut away the covering. You'll need an 18-inch-long servo extension for each servo and a Y-harness, too, if you don't use a computer radio.

bow, but this was not a problem once it had been attached to the wing.

Because the windows are large, I strongly recommend that you install a pilot figure. Pilots By Diane makes a 1/4-scale, full-body pilot that is dressed to match the T-Craft and looks great in the model. I painted the cockpit with white Perfect Paint and then applied the supplied instrument-panel decal. I installed the windscreen and the windows after trimming them to size, and they fit well.

CONCLUSION

The Hangar 9 clipped-wing Taylorcraft is very impressive. I was pleased with the overall construction and the ease of assembly. There were no warps, twists, or waves, and the materials used are above average in quality. Whether it's waiting in the pits for its next flight or doing graceful aerobatics, the Taylorcraft is always the center of attention. ✈

SPECIFICATIONS

MODEL: clipped-wing Taylorcraft ARF
MANUFACTURER: Hangar 9
DISTRIBUTOR: Horizon Hobby Inc.
TYPE: aerobatic giant-scale ARF
WINGSPAN: 85½ in.
WING AREA: 1,315 sq. in.
WEIGHT: 15 lb.
WING LOADING: 26.3 oz./sq. ft.
ENGINE REQ'D: 1.08 to 1.48 2-stroke, 1.20 to 1.82 4-stroke
ENGINE USED: Moki 1.35 2-stroke
PROP USED: Zinger 16x8
RADIO REQ'D: 4-channel w/5 servos (rudder, elevator, throttle, 2 ailerons)
RADIO USED: Airtronics RD6000 Super
FUEL USED: Cool Power 5% nitro
LIST PRICE: \$379.95

FEATURES: built-up lite-ply and balsa ARF covered in UltraCote; painted one-piece fiberglass cowl with molded-in scale details; painted-fiberglass wheel pants; wheels; painted-aluminum landing gear; finished wing struts; photo-illustrated instruction manual and all the hardware needed to complete the kit.

COMMENTS: very few extras are needed to finish the model. You'll need glue, radio gear, an engine and muffler, fuel tubing and a prop. It's a complete kit, and it looks great in the air. It's always the center of attention at my field!

HITS

- Beautiful color scheme.
- Easy to assemble.
- Wonderful flight characteristics.

MISSSES

- Wheel pants crack easily during assembly.

Airtronics (714) 978-1895; airtronics.net.

Bisson Custom Mufflers (705) 389-1156; bissonmufflers.com.

Carl Goldberg Products (678) 450-0085; carlgoldbergproducts.com.

Cool Power; distributed by Morgan Fuels division of Morgan Inc. (205) 347-3525; morganfuel.com/coolpower.htm.

Hangar 9; distributed by Horizon Hobby.

Horizon Hobby Inc. (217) 355-9511; horizonhobby.com.

Moki; distributed by Horizon Hobby.

Perfect Paint; distributed by Chevron Hobby Products (419) 433-8479; perfectpaint.com.

Pilots By Diane (514) 246-4543.

Zinger; distributed by J&Z Products (310) 539-2313; zingerpropellers.com.



SR Batteries

Bantam Monoplane & Biplane

Easy-build, easy-fly electrics

by Bob Aberle

SR Batteries' growing line of high-quality, electric-powered model kits has again been expanded with two backyard/indoor RC flyers. The new design—the SR Bantam—is available in both monoplane and biplane versions. Which to choose? The biplane has a lighter wing loading and will therefore fly at much slower speeds, so it's well suited to newcomers and indoor pilots who fly in a gymnasium or auditorium.



THE KITS

The Bantams are nearly identical; the only difference is the inclusion of a second (lower) wing on the biplane. The CAD-drawn designs have been precisely laser cut out of balsa and plywood without the usual burned edges, and it's nearly possible to build either kit without a hobby knife or a razor blade. The spars, leading edges, trailing edges, plywood formers and motor mounts are all supplied and laser-cut to the exact sizes. The included instructions are a work of art, and a first-

time builder shouldn't have any problem assembling either model. I built both kits for this review, spending part of approximately five evenings building the first and only four on the second (you get faster as you learn!).

Each kit comes with a bag of high-quality accessory parts such as wheels, wing dowels, control-rod keepers and landing-gear-mount screws, so you won't have to shop around for a lot of extra hardware. Both the landing-gear wire and the control-rod wire are supplied as are control-surface hinges and a simulated windshield. You'll need to buy a roll of covering material; one roll of the recommended Hangar 9 UltraCote Transparent Lite will cover the entire plane. You'll also need thin and medium CA.

Both Bantams were designed to use the same power and RC system as is supplied with the popular GWS Pico Stick and Tiger Moth ARF models; that's great for anyone who wants to build the kit after getting some experience on the ARF model. For those who don't already have this equipment, SR Batteries offers a power system package that includes a GWS IPS DXA motor geared 5.86:1, a GWS 9x4.7 orange plastic prop, an SR 7-cell, 150mAh Ni-Cd battery pack and a Jeti 5A speed control with BEC. These components come prewired with miniature JST connectors, so you don't need to solder; they're strictly plug and play.

In addition to the power system package, SR offers suitable RC system components, namely an MPI 6800 micro receiver and two MX50HP microsensors. You'll also need at least a 3-channel radio and a battery charger.

SPECIFICATIONS

MANUFACTURER: SR Batteries Inc.

MODEL: Bantam monoplane and biplane

TYPE: electric backyard and indoor kit

WINGSPAN: 39 in. (monoplane),
32 in. (biplane lower wing)

WING AREA: 210 sq. in. (monoplane),
380 sq. in. (biplane)

LENGTH: 24 in.

WEIGHT: 8.6 oz. (monoplane),
9.4 oz. (biplane)

WING LOADING: 5.9 oz./sq. ft. (monoplane),
3.6 oz./sq. ft. (biplane)

DRIVE SYSTEM USED: GWS IPS DXA
geared 5.86:1; GWS 9x4.7 prop; Jeti JES
050 ESC

BATTERY USED: SR 7-cell, 150mAh Ni-Cd

RADIO REQ'D: 3-channel with 2 servos

RADIO USED: Hitec Eclipse, GWS R-4P
micro receiver, two Dymond Modelsports
60 miniservos (monoplane), two Hitec
HS-50 microsensors (biplane).

PRICE: \$49.95 (monoplane), \$54.95
(biplane), \$99.95 (both); \$79.95 (power
package), \$99.95 (RC system package)

FEATURES: laser-cut balsa and plywood
parts; all necessary hardware; landing
gear; wheels; hinges; windshield decals;
40-page instruction manual; and "SR
Basic Covering Techniques" volume.

COMMENTS: although either Bantam
would be an ideal first kit-built model,
both are enjoyable "builds" for experi-
enced modelers as well. With pleasing
looks and great aerodynamic designs, the
models fly well indoors and outdoors in
light wind.

HITS

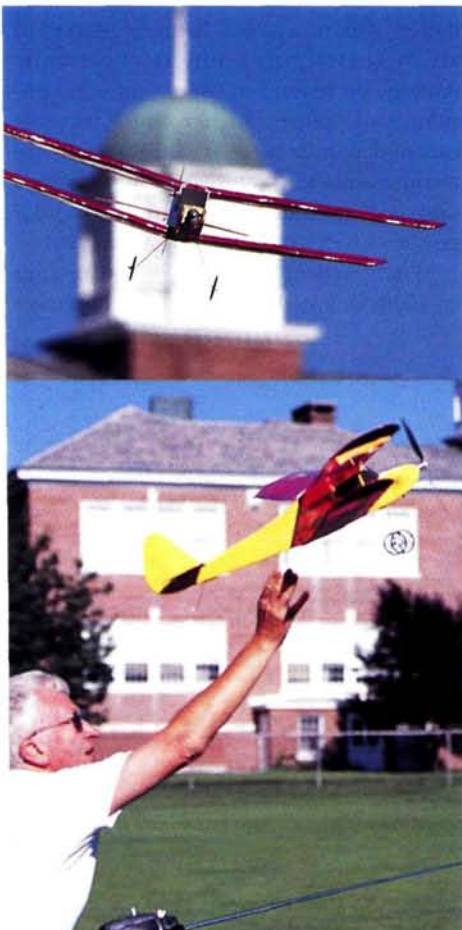
- Excellent aerodynamic design.
- Easy to build, easy to understand and easy to fly!
- Super detailed instructions.
- Accurately designed and laser-cut parts practically eliminate the need for a hobby knife or razor blade.

MISSSES

- None.

ON THE BENCH

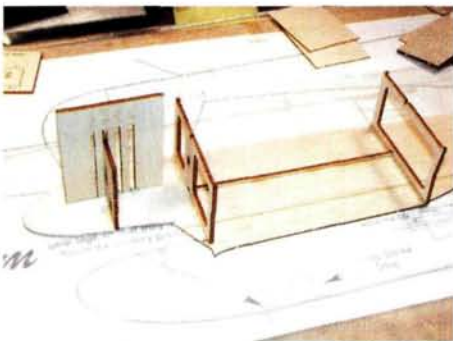
The 40-page instruction manual includes more than 100 detailed, clear photographs. I followed the suggested assembly sequence and didn't have any difficulty at all. In many places, the instructions read: "Don't glue anything yet!" or "Listen up." This is so you don't accidentally skip ahead in the assembly or build two left wing panels instead of a right and a left. The warnings are important, so be sure to read every word as you go along.





Bantam's monoplane kit consists of four sheets of laser-cut balsa parts, plus one sheet of laser-cut plywood parts along with control-rod material, landing-gear wire, hinge material and simulated windshield material.

Motor mount. A unique item in this kit is the breakaway plywood motor mount. You first CA two pieces of laser-cut plywood together, then trim the assembly so that one end fits inside the molded-plastic motor housing while the other passes through a hole in the firewall and then into a hole in the first fuselage former. A single screw holds the motor mount in place. This is a very easy mounting method. If you use a connector to attach the ESC to the motor, it's easy to change



Start of the fuselage structure. The plywood template helps to keep the formers perpendicular to the sides while you CA them into place.



The ribs, the upper and lower main spars and the two turbulator spars are all laser-cut to size. No trimming is necessary. This photo details wingtip construction prior to sanding.

motors, even right at the field. On a rough or crash landing, the motor mount will break away, usually saving the motor shaft and gears. Replacing the mount is also simple.

Pushrod installation. The control-rod scheme is really interesting. Place the provided 0.032-inch-diameter wire inside a thin-wall aluminum tube leaving a short length protruding at each end. Then attach the wire ends to the servo output arm and the horn to the control surface, and position the tube so that an equal length of wire pro-

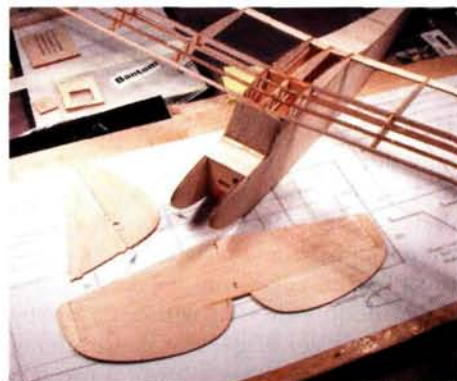
trudes from both ends. Next, cement the tube to the wire. The tube acts as a wire stiffener and moves along with the wire. This works well and is simple and neat!

Hinging. The new SR Gapless Hinge Tape included in the kit works much better than iron-on covering material and is quite durable. After covering your stab and elevators, position them with about a 1/32-inch gap using a few small pieces of masking tape. Cut a length of the hinge tape, peel off the protective backing and carefully apply it along the hinge line. Press down firmly, and you'll have a perfect hinge. The material is clear, so your covering material will show through. I plan to use this tape on all of my future models.

Covering. UltraCote Transparent Lite iron-on covering has long been my favorite for small models. I have found that it's helpful to use two irons—one set on low heat (25 percent) to tack the covering to the wooden frame, and the other set at a higher heat (75 percent) to shrink the material and eliminate all of the wrinkles. Each SR kit comes with a volume from Larry Sribnick's series on modeling, "SR R/C Techniques." The Bantam kits come with "Basic Covering Techniques," which provides information that newcomers to covering will find especially useful.

Battery access. With most electric-powered models, you need to remove the wing to access the battery pack for charging, but SR designed the

Bantam so that a flat 7-cell, 150mAh Ni-Cd pack is accessible through a hole in the lower part of the firewall. The battery actually protrudes about 1/2 inch. I used hook-and-loop fastener to hold the battery in place. The battery cables are positioned so that they hang just below the motor and are accessible from the outside of the fuselage; you need only to disconnect the battery and attach your charger cable. You can also remove the pack and substitute a freshly charged one. To separate the hook-and-loop fastener, I insert a 1/32-inch ply stick (the equivalent of a tongue depressor) between the fastener halves and work it upward inside the fuselage. Once the fastener has been completely separated, I remove the battery from the fuselage.



The Bantam monoplane structure before final assembly and covering.

A few words of caution: stay within SR's recommended parameters. Going to more battery cells or a larger-diameter prop with an increased pitch might make your Bantam fly faster, but the motor will consume more power; higher motor currents can and will damage it. Stay within the recommendations, and you should have a long-lasting model that is fun to fly and a power system that will enjoy a long life.

When recharged at a 3C rate (0.45 amp or 450mA), a battery will reach full charge



Complete structure of the SR Bantam biplane just before it's covered.



With the center of gravity shown on the plan and the total weight within the specified guidelines, both the monoplane and biplane literally flew right off the building board. Control-surface movement for the rudder and elevator were set exactly as indicated in the instructions (and never need to be changed!).

TAKEOFF AND LANDING

My flying field is somewhat rough, so I hand-launched the models most of the time, but they will take off from the ground quite easily without needing a steerable tail-wheel. Landings can be done very slowly—especially with the biplane because of its much lighter wing loading.

GENERAL FLIGHT CHARACTERISTICS

The models are very docile in flight and have wide speed envelopes. There appeared to be plenty of reserve power using the GWS DXA motor and the 9x4.7 prop, so I was able to cut back considerably on the power while cruising around, and I obtained flights lasting more than 7 minutes.

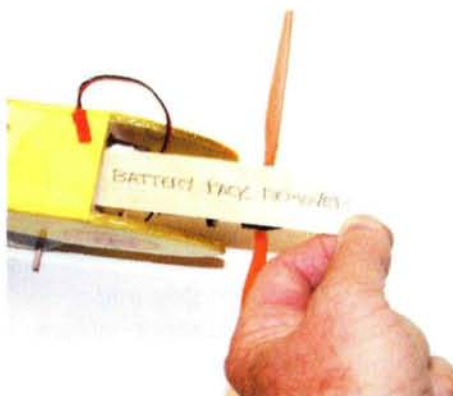
I haven't yet had the opportunity to fly either model indoors, but I know that both prototype Bantams have been flown regularly in a small, 70x90-foot gymnasium. That gym is so small that you end up constantly turning the models away from walls, ceilings and basketball hoops, but the Bantams handle these conditions well.

in 20 minutes, so an extra pack will help to reduce your wait between flights.

Final touch. The kits come with a new matte black material that simulates the windshields. It has a sticky back that is covered with a protective material. You trace the patterns for your front and side windows and then cut them out with scissors. Remove the protective backing and press the "windows" into place. The flat black makes a realistic windshield.



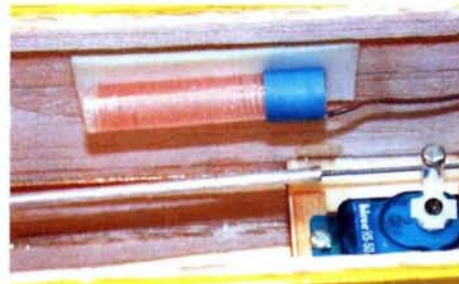
Underside of the monoplane shows the landing gear and wheels. A GWS IPS DXA motor is installed on a plywood breakaway mount. The mount passes through laser-cut holes in the firewall and first former.



I used hook-and-loop fastener tape to hold the battery pack in position. To easily remove the pack, I insert a 3/32-inch ply stick that resembles a tongue depressor between the fastener halves.

SUMMARY

The SR Bantam design has the right proportions; in other words, it just looks right. Aerodynamically, it also has the right proportions: the tail areas are correct, and the fuselage moment arms (nose and tail) are almost perfect. The airfoil is also a good choice. When you put it all together, it isn't any surprise that both planes can be balanced quite easily, and they fly really well. I ended up with the servos about midway in the RC compartment on the



I substituted an E-Cubed base-loaded antenna (model M-72-U) for the 39-inch receiver antenna. This "stubby" antenna is only 1½ inches long and is taped to the inside of the fuselage side. Radio range is said to be reduced by only approximately 15 percent when using this short antenna.



Inside the biplane RC compartment. At the left are the two Hitec HS-50 microservos, and in the center is the GWS R-4P micro receiver removed from its case. To the right of that is the Jeti JES 050 ESC, and farther to the lower right is the end of the battery pack.

monoplane and farther forward on the biplane. The motor and battery do a good job of helping you achieve the right balance.

The instructions, detailed photos and "Basic Covering Techniques" provide all the backup material needed to build and fly either model. Because each kit is CAD engineered and precisely laser-cut, all of the parts fit well and were properly aligned without trimming of any kind (the only exception was the motor mount, but even that took very little effort to fit properly).

Builders will also be pleased by the prewired, plug-in SR power system package. The Bantam monoplane and biplane are perfect models for first-time backyard and indoor fliers. I have only good words to write about this entire building and flying project. ✦

Dymond Modelsports USA Ltd.

(888) 4FUN FLY; (920) 303-1100; rc-dymond.com.

E Cubed R/C (937) 849-0418; azarr.com.

Hangar 9; distributed by Horizon Hobby Inc.

(800) 338-4639; horizonhobby.com.

Hitec RCD Inc. (858) 748-8440; hitercd.com.

Jeti; distributed by Hobby Lobby Intl.

(615) 373-1444; hobby-lobby.com.

SR Batteries Inc. (631) 286-0079; srbatteries.com.

Make spinners for electrics

A lightweight alternative

by Mark Rittinger

One of the challenges faced by scale electric modelers is the need to reduce weight. This became clear to me when I designed an electric-powered P-40 Warhawk. The plane has accurate scale outlines, and with a 42-inch span, it required a 3-inch-diameter spinner. I weighed a commercial spinner and found that it weighed a whopping 4¾ ounces. The size and shape were correct, but the weight was not! I definitely needed something much lighter.

To produce my own spinner, I found that I could vacuum-form a lightweight spinner over the commercial spinner. I also made a new plywood backplate. Give it a try; you'll be surprised at what you can create with some sheet plastic, plywood and a little practice!



1 First, find a commercially available spinner of the correct size and shape. If one is not available, you could make one by turning a balsa block on a lathe or a drill. Assemble the spinner and use automotive body putty such as Bondo to fill in the screw holes and prop cutouts. After the putty has dried, sand it to match the spinner's contours.

When the sanding is complete, gently push on the putty in the prop cutouts until it's slightly lower than the outer surface. To prevent the putty from falling out, secure it with a few drops of thin CA. The idea is to create a shallow area to use as a guide when you trim the new spinner. Next, glue a 1-inch balsa block to the spinner's bottom to prevent the plastic from webbing around the bottom during the molding process. Also, put a small groove between the block and the backplate; this will leave a cutting guideline.



Use a forming frame with a hole that's 2 inches larger than the spinner diameter desired (in my case, a 5-inch-diameter hole for a 3-inch spinner). I used 0.030-inch-thick acetate for the 3-inch spinner and it worked well. If the plastic doesn't snuggle down tightly over the mold during the forming process, use a heat gun to heat the plastic around the edges to get it to pull down properly.

3



4

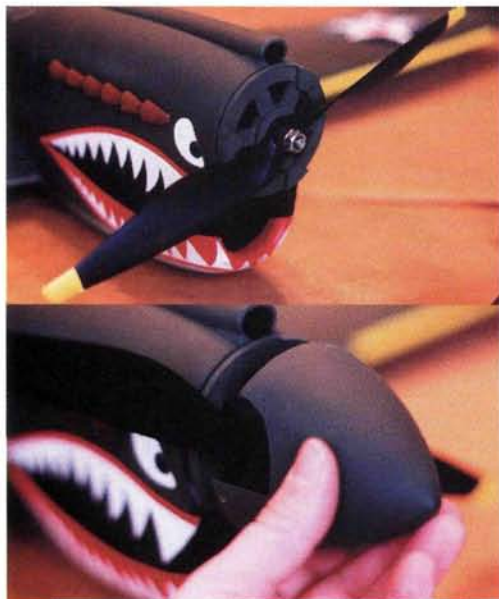
Make a new backplate from ¼-inch-thick aircraft plywood. I used a compass to draw the backplate and to plot lightening holes and a jeweler's saw to cut out the holes. You could also drill a series of holes and then trim them to size. Just remember to keep them equidistant for balance purposes.

Make three or four plywood or hardwood mounting pads, and glue them (equally spaced) onto the backplate. You may also need to make a standoff in the center of the backplate to lift the prop up so it clears the backplate. After the glue has dried, balance the backplate on a prop balancer.

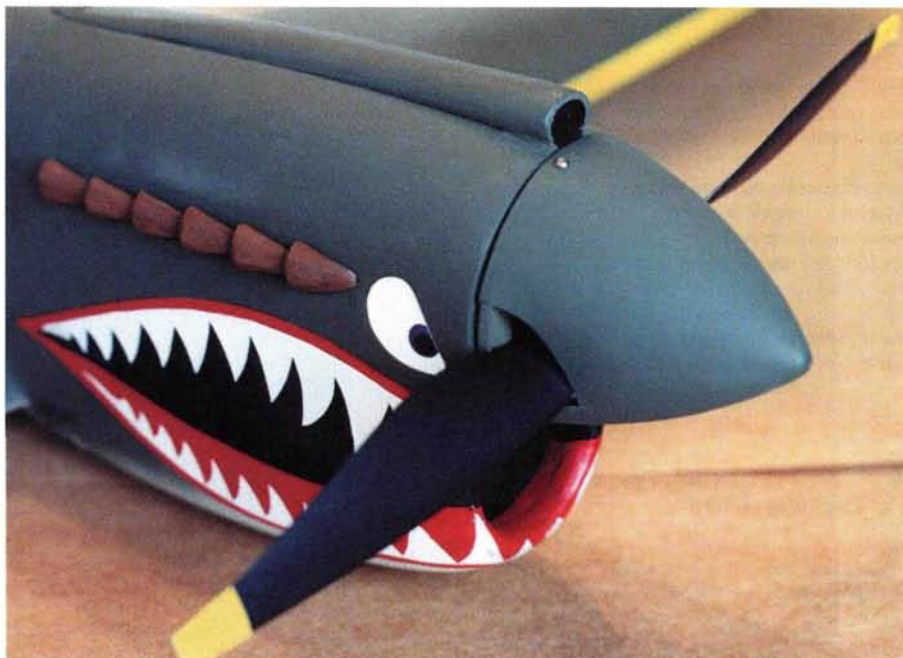


5

Trim the excess plastic off the spinner, cut out the prop opening, and test-fit the spinner on the backplate; adjust as necessary. With the backplate flat on your workbench and the spinner sitting perfectly flat and centered, drill the holes for the sheet-metal screws that will secure the spinner to the backplate.



6 Attach the backplate to the model's output shaft, and then install the prop and spinner. Note the alignment marks on the backplate and spinner. Slowly turn the spinner to check its runout (wobble), and make any necessary adjustments. A wobbly spinner will cause vibration and certainly doesn't look very good. Last, paint and balance the entire spinner assembly.



7 Here's the completed spinner ready for flight. The P-40 spinner pictured here has held up to 6,500rpm and is strong enough to allow the plane to be stood on its nose for storage. It weighs only 1 ounce—a 3¼-ounce weight saving. Not too bad for little effort. ✚

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by John Simmance

The Solaris

An IMAA-legal biplane with looks and performance!

The Solaris is an aerobatic yet easy-to-fly IMAA-legal biplane that looks great on the ground and superb in the air! The prototype weighed slightly more than 12½ pounds and was powered by various engines. The best performance was provided by a YS 1.20 4-stroke, but a YS .91 and a SuperTigre S90K 2-stroke also proved perfectly adequate. The second, much lighter model (presented here), is powered by a YS .91, and it flies very well.

Start construction by cutting out all the parts. It's time-consuming and not much fun, so get the boring stuff done first! Once you get into the actual building, it will go much faster and you will enjoy it more! Although it isn't particularly difficult to build, the Solaris is not for beginners; it is intended for advanced builders.

SPECIFICATIONS

MODEL: Solaris

TYPE: biplane

WINGSPAN: 61 in.

LENGTH: 55.5 in.

WING AREA: 1,282 sq. in.

WEIGHT: 11 lb.

WING LOADING: 19.75 oz./sq. ft.

ENGINE REQ'D: .90 2-stroke to 1.20 4-stroke

ENGINE USED: YS .91 4-stroke

RADIO REQ'D: 4 channels (rudder, elevator, aileron, throttle)

COMMENTS: designed by John Simmance, the Solaris is an IMAA-legal biplane and uses traditional balsa and plywood construction. The plan is CAD-drawn, and many parts are self-aligning. The plan is highly detailed, and a construction jig is shown to help you position and solder the cabin strut wires together.

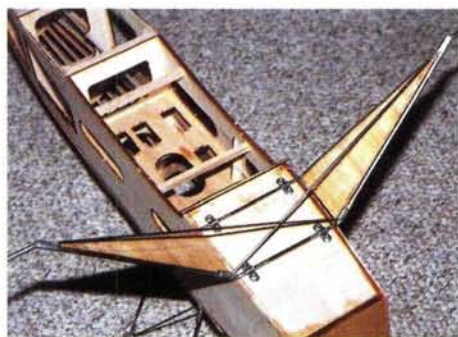


All models look great just before they're covered. Here, the Solaris shows off its classic biplane lines and awaits its Solartex "skin."

FUSELAGE

Start by assembling the sides, and remember two important points: first, the sides are not identical; the left side is longer in front than the right side. This produces the built-in engine downthrust and side thrust. Second—and this is the sort of mistake I make without trying—remember to build identical but mirror-image sides with the top longeron glued to the inside of each side. I drew the fuselage side patterns with the text on the inside surfaces of each. If you glue the longerons, the fuselage doubler and the top fuselage joiners to the text sides, you will be fine.

Before you join the fuselage sides, glue the $\frac{1}{8} \times \frac{3}{8}$ -inch spruce top longerons, the fuselage doublers and the top fuselage joiners into place. To install the longerons accurately, temporarily place the formers over the longerons and in the fuselage side slots to hold them in place. But don't



The model uses wire landing-gear struts, as shown here, but you can use a commercially available unit if you like.

glue the formers in yet! Cut away and chamfer the inside rear ends of the fuselage sides (as shown on plan sheet 1) to allow a $\frac{1}{4}$ -inch-thick piece of wood to fit snugly between them when they are drawn together. This space will later accept the spruce lower fin spar. Glue the $\frac{1}{4}$ -inch-square

balsa stiffeners to the rear faces of formers F4, F5, F6, F7 and F8 as indicated on the plan. If you fit together the completed fuselage sides, formers F2, F3 and F4, the servo mount and the cockpit floor (SMCF), you will find that the parts all align. Fit everything together with the fuselage placed on its side on a flat surface, and use a square to check that everything is as it should be. Be sure that the fuselage-side's aft ends line up exactly with each other. When you are satisfied that all is correct, run CA glue into the seams and joints.

To prevent the fuselage sides from bowing outward when you pull the aft ends together, cut two or three $\frac{1}{4}$ -inch-square balsa pieces and temporarily glue them between the sides at the lower wing opening. They will be removed before the RC gear is installed. Pull the fuselage sides together, and glue formers F5, F6, F7 and



The front of the fuselage with the fuel-tank hatch cover in position.

F8 into place as well as the ply crosspiece F10 on the lower rear of F4. Before you complete the fuselage front, drill holes in part LGM1 to match your landing gear, and install blind nuts on its upper, inside surface. It's really tough to do it later!

Install blind nuts for the engine mount in the rear face of F1. (The holes shown on the plan are for a Hayes AL-60 mount.) Drill the holes for the fuel line and vent line as well as for the throttle cable. Bring the fronts of the fuselage sides together and install F1 and F2a (making sure F2a is vertical), the fuel-tank compartment floor (FTCF) and LGM1, LGM2 and LGM3. Former F1 may look a little odd; it's cocked a smidgen down and to the right, but that is where it is supposed to be. It correctly sets the



SEE COMPLETE, DETAILED BUILDING INSTRUCTIONS

You will be surprised by how easy the Solaris is to fly. Make sure the CG is in the right place (as shown on the plan); the location shown offers a good compromise between stability and maneuverability. Do a complete preflight check, including a radio-range check (with the antenna collapsed) to make sure all is functioning perfectly. Do the check at a range of at least 150 feet with the engine running. I do a range check every time before I fly.

Once you are confident that the aircraft is as it should be and that the radio is working perfectly, start the engine, warm it up, and make sure it runs well at full throttle and idles reliably. Now take a deep breath and taxi out to the runway. Hold a little up-elevator, advance the throttle slowly and smoothly, and be ready to feed in some right rudder to keep the model running straight along the runway. As soon as you have some speed, and the Solaris is tracking straight, release some of the up-elevator and let the tail come up; by now, you should be at full throttle. Ease in a tad of up, and you're flying!

I am a scale modeler and I have been an RC flight instructor, but I don't consider myself an experienced aerobatics pilot. Nevertheless, within my own abilities, I found the Solaris exciting to fly. It is very capable of mild aerobatics. The first model had only one peculiarity: when inverted, it didn't need any down-trim to fly level. If left alone, it actually climbed fairly energetically.



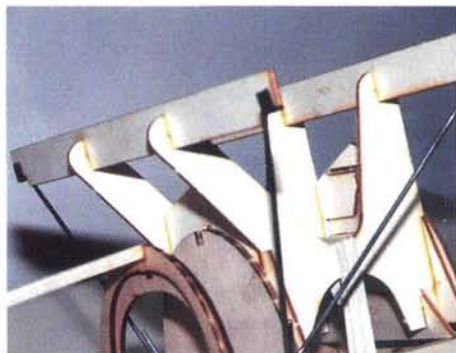
That didn't worry me at the time; I figured I would rather have it gain altitude when inverted than lose it. But because of that tendency, on the second model, I reduced the original $3\frac{1}{2}$ degrees of downthrust to only 2 degrees.

The Solaris spins very well, and recovery is immediate as soon as you neutralize the controls. And those who flew it and

whose aerobatics abilities were vastly greater than mine were all favorably impressed (I never argue with favorable impressions!). The model stays where you point it, and it is very stable; the CG is fairly far forward, and this ensures easy flight characteristics.

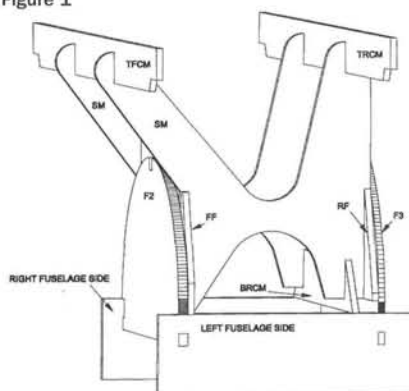
Roll rate and elevator response are a function of control throw, and because of my preferences, even on high rates, I never tried to exceed my abilities. On low rates, Solaris is a pussycat. Add down-trim for high speed, and remember that elevator controls pitch attitude and throttle controls altitude. As you reduce speed to prepare for landing, throttle back, and then feed in up-trim to maintain altitude. Losing speed is really difficult in a dive.

During landings, the Solaris has no bad habits. As you should with any large model, let it settle onto the runway while carrying a little power, and then close the throttle gently just as the wheels touch! I don't have to tell you any more because now you know that you didn't have to take such a deep breath; and by the time you land, you will know what a delight Solaris is to fly!



Above: here, the cabane assembly jig is in position on the Solaris. The jig parts are shown on the plan.

Figure 1



Placement of cabane strut jig on fuselage.

engine downthrust and right-thrust angles! Next, glue the $\frac{1}{4}$ -inch-square balsa stringer into the top notches in formers F2a, F2 and F3. Let the ends stick out a bit beyond the formers so they can be trimmed later.

CABANE STRUT JIG

One thing that gives most biplane builders—including the experienced ones—fits is bending and fitting into place the cabane struts. The plan shows an alignment jig that makes the job easier (Figure 1). Use the "Metal Parts" drawings (sheet 3) as a guide and bend all the cabane parts to shape. They should fit the drawings closely. Tin the struts in all the places where solder joints will be made (use a liquid acid flux). Assemble the jig parts and glue them together while using the fuselage as a base. Don't glue the bottom rear cross-member (BRCM) into place; this is so you'll be able to position and remove the jig. Place the wire parts into position and lower the jig over them. Tape the jig into place and then tape the strut ends securely into the jig. This holds the strut ends in exactly the correct positions. Once all the glue has set and the wing incidence is correct, solder the diagonal strut wires into place. Remove the struts, wrap all the joints with thin wire, and then reposition them in the jig. Tape everything back into

place, and run solder into all the joints, filling the binding wire. Remove the jig, clean the cabane assembly, and then epoxy and bind it to formers F2 and F3. Use the jig to make sure that the strut assembly is properly positioned; once the epoxy has set, remove the jig.

The rest of the fuselage assembly is clear sailing. Install the $\frac{1}{8} \times \frac{1}{4}$ -inch balsa stringers from F4 aftward, noting that every other stringer ends a short distance aft of F6. Trim the stringers at F4 to allow the $\frac{1}{32}$ -inch-ply cockpit turtle deck to lie flush over them aft of F4.

Install all the control pushrods and/or guide tubes while the fuselage structure is still open and accessible. The plan shows the exact positions for these. Glue the 10, $\frac{1}{8}$ -inch-ply servo-mount reinforcements onto the upper SMCF surface as shown on the plan. The fuel tank, control runs and servos can all be temporarily installed at this point. If you plan to install blind nuts to attach the tailwheel assembly to F9, do it first and then glue it and F9a in position. Install the bottom, rear, cross-grain fuselage sheeting after all the top decking has been completed and after all the systems have been installed.

Doing one side at a time, glue into place the $\frac{1}{32}$ -inch-ply, front-fuselage turtle deck. When both sides have dried, trim the front edges flush with the front of former F2a. Using the front of the fuselage as a guide, build the fuel-compartment hatch.

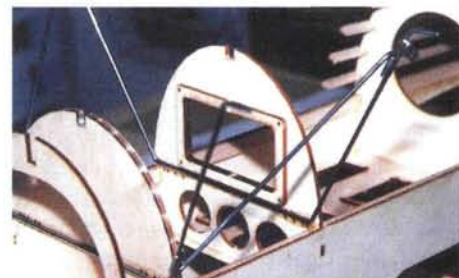
All that's left is to epoxy the wing mounting blocks into place, add wooden fairings to the cabane struts, install the radio gear and glue the rear bottom sheeting into place, and the fuselage will be ready to cover.

TAIL SURFACES

These can be built flat over the plan and should not present any problems at all. Though the spruce main spars in both horizontal and vertical planes are difficult to cut hinge slots in, they greatly strengthen the tail surfaces and are very strongly recommended. Also, the $\frac{1}{4}$ -inch-balsa gussets may take time to install but are worth the effort; they make the tail surfaces more robust!

WING CONSTRUCTION

The wings are best built on a wing jig, and rib alignment holes are shown on the plan. To speed construction, I clean up the steel alignment rods with very fine sandpaper; then, with a fine permanent marker, I make little marks at $2\frac{1}{2}$ -inch intervals for the rib spacing. Cleaning the rods is a good idea anyway; it removes any



The completed cabane-strut assembly in position on the fuselage.

traces of rust and glue left after your last building job.

The center section of the lower wing only is built up around the dihedral braces, and it can easily be assembled in your hands, but using the wing jig for this avoids a twist being built into it. For ease of handling, the upper wing is built in two halves, although it has no dihedral. Insert the flat wing joiners into one wing half (right wing shown on the plan), then thread the other wing panel onto the joiners.

Install as much of the wing sheeting as you can while the wing structure is still on the jig alignment rods. This prevents any twists from being built into the wing prior to its being removed from the rods. Install the wingtips after you've removed the main wing structure from the jig. Feather the rear edges to shape as indicated on the plan, then glue the wingtip edges into place above and below the wingtip plate. Sand them to a smooth rounded profile at the outer and leading edge and to a finer, sharper trailing edge, but without removing the raised inner edge over wingtip plate WT; this strengthens and stiffens the wingtip.

The barn-door ailerons are built as part of the wing and are then cut free of it. The cutout areas are sanded smooth and $\frac{1}{32}$ -inch vertical-grain sheet is applied to the ailerons' leading edges. Make the aileron servo-wire tubes out of $\frac{1}{2}$ -inch-diameter model-rocket tubes, or simply roll and glue bond paper around a $\frac{1}{2}$ -inch dowel to form your own. I used Airtronics 102 servos, so all aileron servo-mounting holes on the plan are sized for Airtronics equipment. The built-in aileron horns can be made out of thin nylon sheet (available



A close-up detail of the tail feathers; note the use of gussets to strengthen the assemblies.



This wing detail shows the lower interplane strut and landing-wire attachments, the aileron servo mount and the paper servo-wire tube. All ribs are capstripped.

from local plastics molding shops).

The strut brackets shown on sheet 3 are the ones I made for both models. They fit very well and incorporate anchors for functional, steel rigging wires. Commercial fittings will also work fine. If you want to use rigging wires, which I recommend, you might also use wire solder tabs from RadioShack as attachment points. Finally, don't forget to install the spruce strut-mounting blocks; they provide a hardwood anchor for all the strut, interplane- and cabane-mounting screws.

SOLARIS PARTS

Laser-cut parts for the Solaris are available for \$170 from Lasercut USA. Call Pat Fallacaro at (845) 561-7662; pjff610@yahoo.com; lasercutusa.com.

Solaris

FSP1202A

Designed by John Simmance, the Solaris is an IMAA-legal biplane and uses traditional balsa and plywood construction. The plan is CAD-drawn and many parts are self-aligning. The plan is highly detailed, and a construction jig is shown to help position and solder the cabane strut wires together. WS: 61 in.; L: 55.5 in.; power: .91 4-stroke; radio: 4-channel; 4 sheets; LD: 2. \$24.95

COVERING

I covered the prototype with white Solartex and painted over the covering. Solartex is very strong and easy to apply, but it's a trifle heavy when it's painted. To save weight, use an iron-on film covering. Assemble the wing-structure components, then cover the wings and ailerons separately. Cover all the fuselage components separately as well, and then hinge the control surfaces into place. I made epoxy/glass engine cowls and wheel pants for both models. If you have experience making these, do so; they aren't really difficult to make, and they enhance a model's appearance enormously.

FINAL ASSEMBLY

If you installed all the control rods and connectors before you added the covering, there isn't much left to do. Install the radio equipment, the engine and the necessary hardware. I installed an internal antenna that runs inside a tube; this method looks a lot neater, and it functions well.

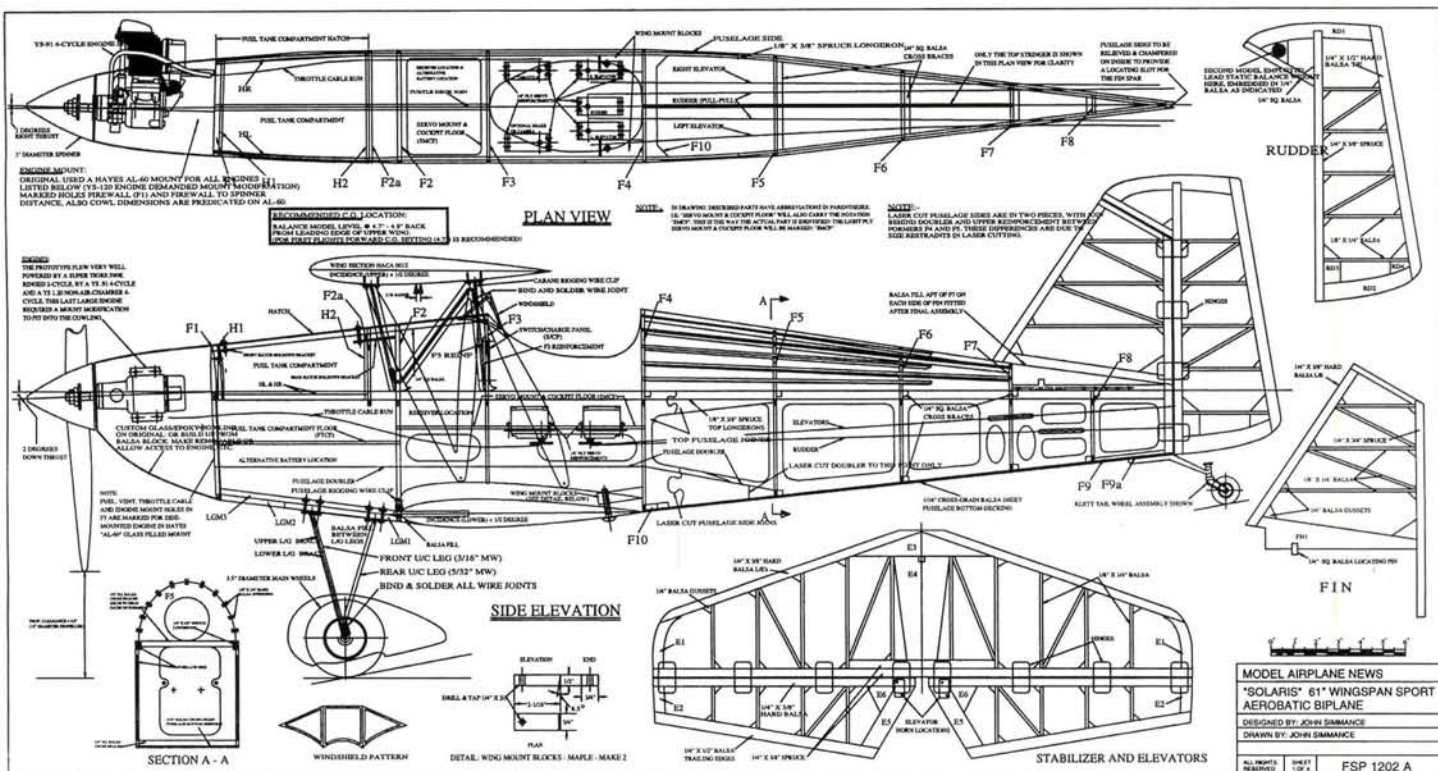
I used the retract channel to trigger a small, fixed-focus, auto film-wind 35mm camera mounted in the cockpit. It took some very interesting pictures, although I had to guess just what the "pilot" might have been looking at.



The completed cabane struts have been faired with wood. Note the hardwood block for upper rear landing-wire attachment.

The Solaris is a great flyer and performs well. I hope you enjoy building and flying yours as much as I did mine. ✈

Airtronics (714) 978-1895; airtronics.net.
Futaba Corp. of America; distributed by Great Planes; futaba-rc.com.
Great Planes Model Distributors Co. (800) 682-8948; greatplanes.com.
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To order the full-size plan, turn to "RC Store.com" on page 160.

Just for the fun of it!

Backyard flyers are great—from models that are no more than a stick with a wing, motor and tail feathers that gracefully float along at minimal speed to ducted-fan jets whose performance matches their exciting looks. This shows that the RC industry has responded to demands for small, simple-to-build-and-fly models for those who want to try their hand at RC flying or more challenging models for experienced pilots who are looking for a refreshing change of pace. Where does the WattAge Tubby Cubby fit in with these requirements? At both ends of the spectrum. Let's take a look.

ABOUT THE MODEL

The Tubby Cubby is a caricature of the venerable Piper J-3 Cub; it definitely has the Cub look, so it's instantly recognizable to Piper fans. The model is constructed of all foam—fiberglass reinforcements and molded plastic—for fast assembly. Tubby Cubby is surprisingly durable; I can attest to its crash-resistance (more on that later)!

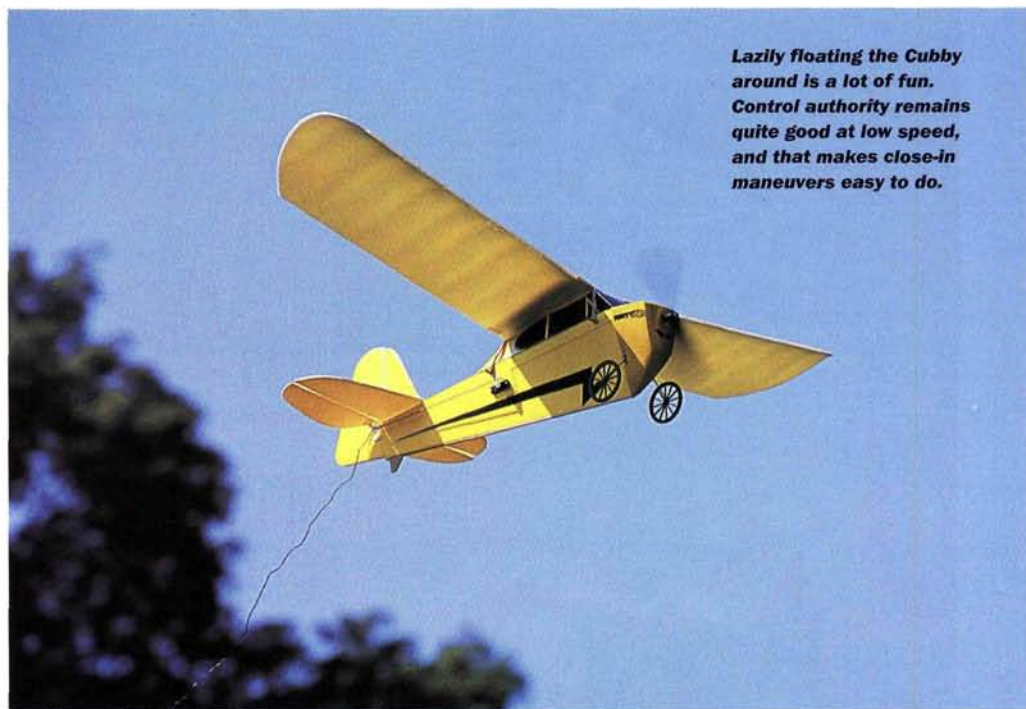
To me, here's the best part: the way it flies. Don't let the Cubby's looks fool you; it makes a great sport model and has aerobatic capabilities for experienced pilots. It's also a forgiving trainer for those seeking to earn their wings. These flight attributes can be traced back to its unique design. The tall fuselage provides great yaw stability and, combined with the ample wing dihedral, gives plenty of stability. It will zip right along or crawl at a snail's pace without any tip-stalling tendencies.

GOOD THINGS COME IN SMALL PACKAGES

The Cubby costs about \$40 and is a great value when you consider that it includes a 370 motor, a gearbox, a prop, fiberglass wing spars, a molded cowl, wheels, formed-wire landing gear and detailed instructions. Items you need to add are a 3-channel radio, two microservos, a 6- or 7-cell 800mAh NiMH battery and a 5A ESC (items that most electric modelers have hanging around looking for a home). This is \$40 well spent.

ASSEMBLY

Look for a complete review of the Tubby Cubby in the January 2003 issue of *Backyard Flyer* magazine; I'll just touch on a few things here. First, the model can be assembled quite quickly; even a first-time builder will have a great flying plane. This is the result of the high degree of prefabrication; check out the kit photo, and you'll see what I mean. Simplicity of assembly notwithstanding, a detailed, 31-page instruction manual with many detailed photos is supplied to ensure success. If you use 5-minute epoxy, you'll easily complete the Cubby in three to four hours.



Lazily floating the Cubby around is a lot of fun. Control authority remains quite good at low speed, and that makes close-in maneuvers easy to do.

SPECIFICATIONS

MODEL: Tubby Cubby

MANUFACTURER: WattAge

DISTRIBUTOR: Global Hobby Distributors

WINGSPAN: 37 in.

WEIGHT: 10.5 oz.

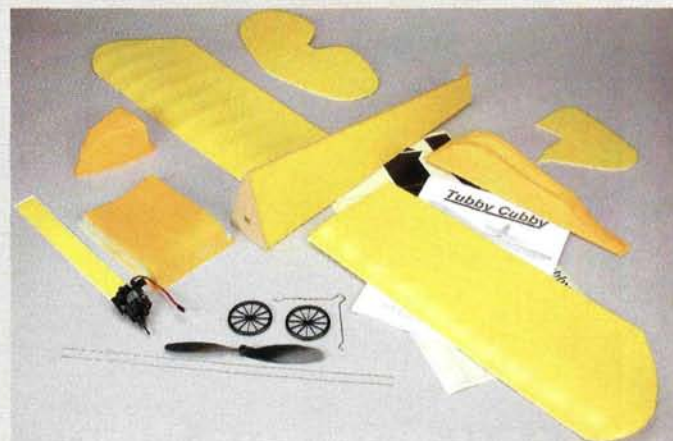
RADIO REQ'D: 3-channel w/2 microservos and 5A ESC

DRIVE SYSTEM USED: 370 motor geared 3.67:1 (included)

BATTERY USED: 7-cell, 550mAh NiMH

FLIGHT DURATION: 9 to 11 min.

PRICE: \$39.99



The Tubby Cubby is a complete kit that can be assembled quickly. The informative manual ensures your success.

HERE'S THE FUN!

Whether you're learning to fly or just tooling around, the Cubby can handle it with ease. It can fly fast; it can fly slowly. It doesn't matter to the Cubby; its design really is deceiving. From the moment the plane left my hand, I could tell WattAge had a winner! With full throttle and a 7-cell, 550mAh NiMH battery, the Cubby climbed like a homesick angel to over 120 feet. Wow! Was that ever a pleasant surprise! I throttled back, and it just lazily floated around while I had plenty of control authority.

I pushed the Cubby to try some aerobatics, and I'm happy to report that it loops, barrel rolls, spins and even flies inverted for short stunts. I had a blast! It was too much fun! Takeoffs, landings and even touch-and-go's on a small baseball diamond are well within the Cubby's bag of tricks.

After a couple of flights, I let one of our staff artists, who had never flown RC, fly the model. I explained the controls and what he should expect from the Cubby and, after gaining some altitude, I turned over the transmitter. For the first 30 seconds



The Cubby in its element—tooling around and having a great time!

or so, he did a great job; then a small gust sharply banked the airplane onto its side. The pilot panicked and froze on the controls. The Cubby went straight in from about 75 feet. "Oh no! There goes a great flying plane to the trash barrel," I thought. When we went to pick up the Cubby, much to our surprise and relief, it had only minimum damage. There were a few wrinkles in the fuselage, the cowl had a small crack, and the prop was broken. There was no other damage! Incredible! I have never seen a foamie hit the ground so hard and sustain such minor damage.

CONCLUSION

The WattAge Tubby Cubby is a great value. It goes together quickly with very little effort. The instructions are first rate and contain a lot of information that virtually guarantees success. But for me, the way the Cubby flies is what I truly love! It's outstanding. If you're looking for a change of pace or a durable trainer, I highly recommend WattAge's Tubby Cubby. ✚

WattAge; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.



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Bolkow Jr. ARF
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BeBe Jodel ARF
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And with Hacker, beauty is more than skin deep. If you think these planes look great, you should see them fly. Performance not usually thought of for planes of this size. Hacker sets the bar.

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ASTROFLIGHT 110 Deluxe Charger

by Bob Aberle

For many years, the AstroFlight 110D peak-detect charger has been one of the most popular units available. Well known for its overall ease of operation and excellent reliability, the 110D could charge up to 18 Ni-Cd or NiMH cells, but it could not discharge a battery.

The new AstroFlight 110 Deluxe is capable of charging from 1 to 24 cells at from 50 milliamps up to 8 amps. Instead of slow and fast charging levels (as in the original model), the Deluxe has one range and a peak-detect cutoff that works throughout the range. The Deluxe also features a built-in circuit to discharge from 1 to 24 cells at a fixed 1A load. Operation couldn't be simpler; a single knob allows you to set the charge current (no menu to learn!).

OPERATION

Like the original 110D charger, the Deluxe uses a 12V DC source (a car battery or an AC power supply such as the AstroFlight 120). It has a 2 $\frac{3}{8}$ x $\frac{5}{8}$ -inch LCD monitoring screen that indicates charge current, the voltage of the battery being charged, the time the unit has been on charge or discharge and the ampere hours of energy into or out of the battery during charge/discharge. These measurements are stored on the screen until the charger is disconnected from its power source.

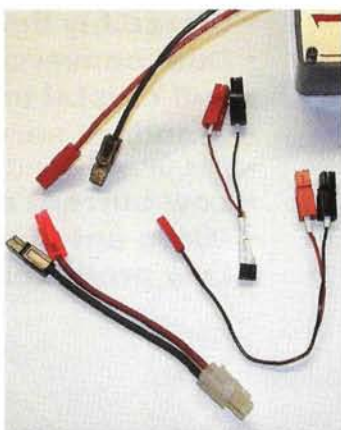
A single potentiometer (knob) control permits you to set the charge current. You simply attach the battery pack and adjust the current, and the charger will operate until the peak voltage is sensed. At this point, the LCD screen will display "Peaked," the charger will beep once, and it will then turn itself off. It does not revert to trickle-charge.

AstroFlight provides enough operational instructions to get you started. Keep in mind that the 110 Deluxe is not an automatic charger; you are responsible for setting the correct charge current. The instructions suggest that Ni-Cd batteries be charged at a 3C rate,

which takes approximately 20 minutes. A 500mAh capacity battery would therefore be charged at 500mA (or 0.500 amp) multiplied by 3, or 1.50 amps. The instructions also note that NiMH batteries should be charged at a 1C rate, which usually takes about an hour to reach full charge. (That's a little on the conservative side; I've found that these cells can easily take a 2C charge rate, achieving full charge in approximately 30 minutes.)

The Deluxe 110 has a cooling fan that stays on all throughout the charging or discharging of a battery pack.

The input cables on the Deluxe are 42-inch lengths of 13-gauge wire, terminating in alligator clips. The output side is a much shorter (8-inch) 16-gauge wire with an AstroFlight Zero Loss connector attached. Most of my battery connectors are of the Anderson Power Pole/Sermos variety, so I simply substituted a pair. If you don't like to solder, AstroFlight offers adapters for most popular connectors.



I changed the output cable to one that worked with Anderson Power Pole-type connectors, but you can change it to work with other types of adapters as well.



SPECIFICATIONS

MODEL: 110 Deluxe

MANUFACTURER: AstroFlight Inc.

TYPE: peak-detect charger/discharger for 1 to 24 Ni-Cd or NiMH cells

INPUT: 12V DC (car battery) or AC-operated power supply

INPUT CABLES: 42-inch-long, 13-gauge wire with alligator clips

OUTPUT CONNECTION: 8-inch-long, 16-gauge wire with AstroFlight Zero Loss connector

CELL CAPACITY: 50 to 5000mAh

CHARGE CURRENT: continuously variable, 50mA up to 8 amps

PRICE: \$129.95

FEATURES: the AstroFlight 110 Deluxe has an LCD screen that monitors all battery parameters, a cooling fan, reverse polarity protection and a single knob to adjust charge current.

COMMENTS: newcomers and experts will appreciate the Deluxe 110's versatility and ease of use.

HITS

- Large range of charge current from 50mA to 8 amps.
- LCD screen monitors all necessary battery parameters.
- Ease of operation via a single knob control.
- No complicated menu system necessary.

MISSSES

- When charging more than 14 cells, unit doesn't quite obtain the full 8A maximum charge current.
- No power on/off switch, so the connectors spark each time you attach them to a car battery.

TEST RESULTS

I spent several weeks using my new 110 Deluxe to charge a variety of Ni-Cd and NiMH packs. Using a 12V car battery as the power input, I was able to charge up to 14

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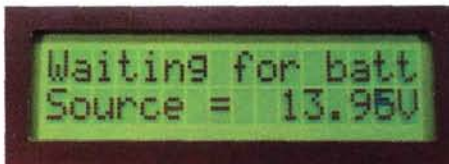
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ASTROFLIGHT 110 DELUXE CHARGER

cells at the full 8 amps. As you might expect, for more cells, the current does tend to fall off a little; for example, on 21 cells, the maximum current I attained was 5.6 amps; at the 24-cell limit, the current dropped to 5 amps. I consider this very acceptable performance. You will get roughly the same results with an AC power supply, provided that it has sufficient current capacity.

In all cases, I could easily adjust the current down to the 50mA minimum. The setting is more sensitive at this low end,



After you apply the 12V DC power input, the LCD screen displays "Waiting for batt."



While the unit is charging, the current is displayed at the upper left of the screen (3.75 amps, in this case). The voltage under charge is indicated at the upper right (9.95 volts). At the lower left, the time on charge is displayed (in this case, only 31 seconds). Also at the lower right are the ampere hours that have gone into the battery so far (only 0.027AH, as this is the beginning of a charge).



When the charge has peaked, the current turns off automatically and the LCD reads "Peaked." Shown at upper right is the peak voltage attained (11.57 volts); at lower left is the time it took to fully charge this Ni-Cd battery (22 minutes, 41 seconds). At the lower left is shown the AH placed into the battery (1.421AH, or 1421mAh).



I've just started to discharge a 7-cell, 1250mAh Ni-Cd battery pack. At the upper left, it states "Discharge." At the upper right is the voltage under load (9.6 volts), which continually diminishes. At the lower left is the time on discharge (57 seconds). At the lower right, only 0.020AH has been taken out of the battery.

so it may take a little fiddling to get it perfect. This low-current capability will be very popular with pilots of backyard and park flyers that use batteries with capacities as low as 50mAh. Keep in mind that the AstroFlight 110 Deluxe is intended only to charge Ni-Cd and NiMH batteries; do not use it with lithium cells.

The Deluxe 110's 1 to 1.2A discharge current load is fixed and is not adjustable. Since there are no switches on this charger, you may wonder how to select between the charge and discharge functions. Well, it's easy. In the charging mode, you first connect the 12V DC input; the LCD screen reads "Waiting for Batt." Then you attach the battery to the output, select the current level and begin charging. To discharge, you first connect the battery pack to the output and then apply the 12V DC input power, after which the LCD screen displays "Discharge." After discharging the battery down to approximately 0.9 volt per cell, the discharge will stop, and the screen will indicate, "Disc Done." You can read the battery capacity on the LCD screen, expressed as "AH" or amp hours (which you can mentally transpose into mAh or milliampere hours).

SUMMARY

In my opinion, the new AstroFlight Deluxe 110 peak-detect charger/discharger is just as reliable and convenient as the original model, with a greater current range, capability of handling more cells and even easier operating features. You won't even have to refer to the instruction manual! Newcomers and experienced e-flyers are sure to be pleased with the operation of this charger. ✦

AstroFlight Inc. (310) 821-6242; astroflight.com.

Flying at out-of-town events

Several readers have asked me about my August 2002 column on travel trailers. The main question is, how do I store wings in my trailer? Here's some information on the setup. It isn't anything fancy, but my system does work very well, and it costs almost nothing.

As I said previously, I made all of my racks from no. 2 pine boards. I used 1x4 boards as rails attached to the sides of the trailer, and for the rack cross-supports, I used 1x3 boards. I screwed them all together with common sheet-rock screws, and I can remove and rearrange them at will. To support the wings, I installed three cross-members about 24 inches apart. On top of them, I applied ½-inch-thick, peel-and-stick foam-rubber padding. The wings rest on the padding and are held in place with no. 64 rubber bands. I loop a pair of rubber bands together and secure them with finishing nails hammered into the edges of the supports—quick and simple! See Figure 1 for details.

FLYING OUT OF TOWN

The main reason for having a trailer in the first place is to make it easier to take your models to local—and not-so-local—fun flies, competitions, or giant-scale meets. Once you get there, however, it isn't exactly the same as flying at your local club field. Some newcomers tell me they haven't attended a big-bird event yet because they think that doing so will require super-human flying skills, and they don't think they're up to the task. Not true! Let's take a closer look at what to expect at and how to prepare for your first giant-scale fly in.

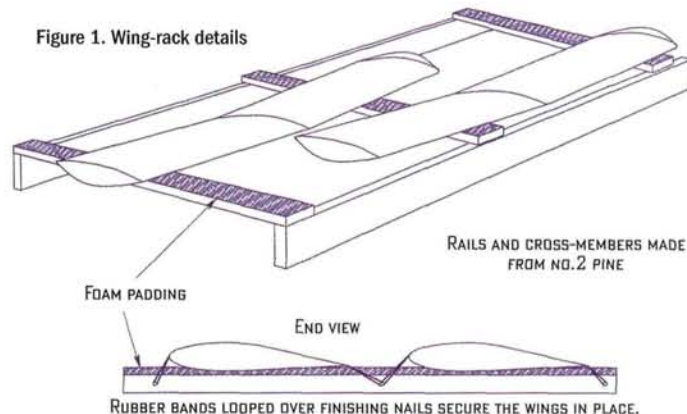
SUPPLIES

Being away from your workshop and your local flying field means that you have to think ahead and take certain supplies. You don't want to lose an opportunity to fly just because you left something at home. A short list includes the basics such as fuel and a fuel pump, spare props, a field charger with charging cords for your transmitter and receiver batteries, basic tools for assembling your model, and your usual collection of flightline gear—electric starter, glow driver, etc. If you are going for a 2-day or longer event, you should consider your creature comforts as well and take a folding chair and a shade tent. Maybe take a friend along and pool your supplies; after all, you are going to need a spotter and helper; you can help each other and have fun doing it. I also like to take my box of basic screws, nuts and bolts, extra receiver battery packs, and my large capacity, deep-cycle marine-grade 12V battery to power all my chargers and my big starter. As the Boy Scouts say—"Be prepared!"

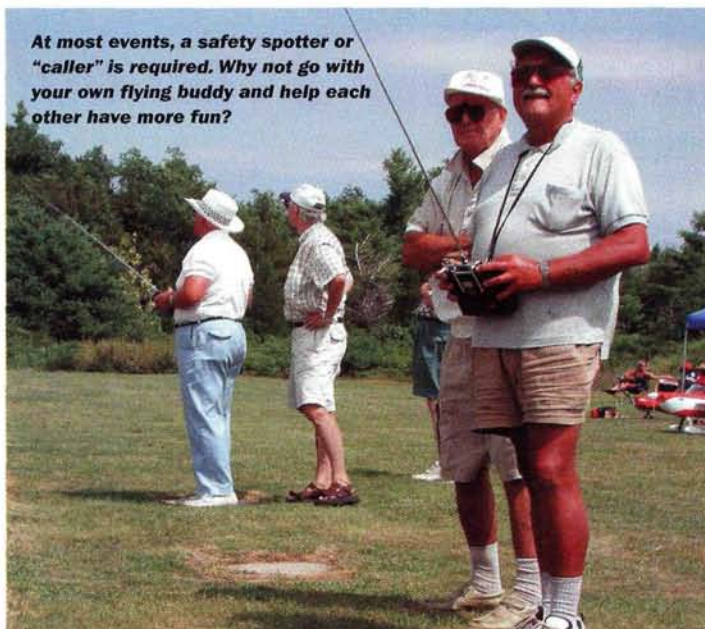


Flying at a big, out-of-town event is a great way to enjoy the hobby and to make new friends. If you haven't attended one before, you might think it's too demanding, but it isn't at all!

Figure 1. Wing-rack details



When you start your big bird, have your safety spotter hold your model securely. Here at the Kingston IMAA/MAAC giant-scale Fun Fly in Kingston, Ontario, Canada, Robby Francis checks his G-62-powered Ziroli AT-6 Texan as his helper holds on.



At most events, a safety spotter or "caller" is required. Why not go with your own flying buddy and help each other have more fun?

REGISTRATION AND SAFETY

Arrive early and set up camp as soon as possible, then head to the registration tent and sign in. Take your AMA card and, for a giant-scale event, your IMAA card. The registration folks will have paperwork for you to fill out, and they'll tell you when the pilots' meeting begins. It's very important to attend this meeting because this is where you'll learn the rules of the day and have an opportunity to ask questions of the contest director (CD). Knowing how things are run beforehand will make the event much safer and more fun. Some of the items covered at the pilots' meeting are the general safety rules you'll need to abide by. Where you can and cannot fly, radio-impound and frequency management are all explained in detail. If you don't understand something, ask the CD to explain it to you.

After the pilots' meeting, take your radio to the impound area, assemble your model and have it inspected, if required. When your model has been signed off, you'll be good to go!

PIT AREA AND FLIGHT STATIONS

One thing you can expect at a big event is a waiting line for your radio frequency. This is normal and is rarely a problem. One way to get more flying time is to take two models and have each on a different frequency. If you have two or more models on the same frequency, your wait will be longer. While you are waiting on line, make sure that your model is ready to go. That means it is assembled and fueled, and its battery pack has been fully charged. This is where field chargers come in handy.

Try to keep your stuff neatly arranged and not all spread out. If the parking lot is nearby, consider leaving seldom used items in the car. There are many other fliers at the event, and space can sometimes be scarce. A deep-cycle, marine-grade 12V battery is a good investment because it lasts a long time between charges, can power many chargers at once and will deliver adequate power for even the biggest electric starter.

When it's time to fly, be sure to have your frequency pin and your field box and starter ready to go at the flight station that's open to you. Large events often have radio frequencies assigned to specific flight stations, so be sure to get in the correct line. Check your area for other models, and get ready to crank up your engine.

Your safety spotter/flying buddy should hold your model securely while you start the engine. Once your engine settles into a solid idle, bring it up to full power, check the controls and pull the throttle back to idle. Check the flightline for landing aircraft or others attempting to take off, and then announce that you are taxiing to the takeoff point. If there is a safety lineman, get his OK before you taxi onto the runway. Once you're lined up on the runway, call out your takeoff, advance the throttle and head for the clouds!

TRAFFIC PATTERN

For both organizational and safety concerns, most fun-fly events require you to fly in the traffic pattern and do any aerobatic maneuvers in a designated area—usually, one that's out in front of you, away from the runway centerline. This is included in the information you're given at the pilots' meeting! Anyway, make



Always keep your pit area neat and uncluttered. The other fliers will appreciate not having to step on your model's wing!

your takeoff nice and smooth, and make your first turn away from the flightline. Trim your model, and check for traffic before you fly back down the runway. This "racetrack" flight pattern is very popular and is used at most events. Because there will usually be three or four (or more) airplanes in the air at one time, you can't simply fly off in any direction and tear up the sky; the chances of a midair collision are just too great! Follow the other pilots' leads and enjoy your flight. If you start to feel crowded, climb to a higher altitude or make a 360-degree turn at one end of the traffic pattern to allow the other planes to fly past you. Your spotter should constantly keep you informed of the other models' whereabouts and what's happening on the ground.

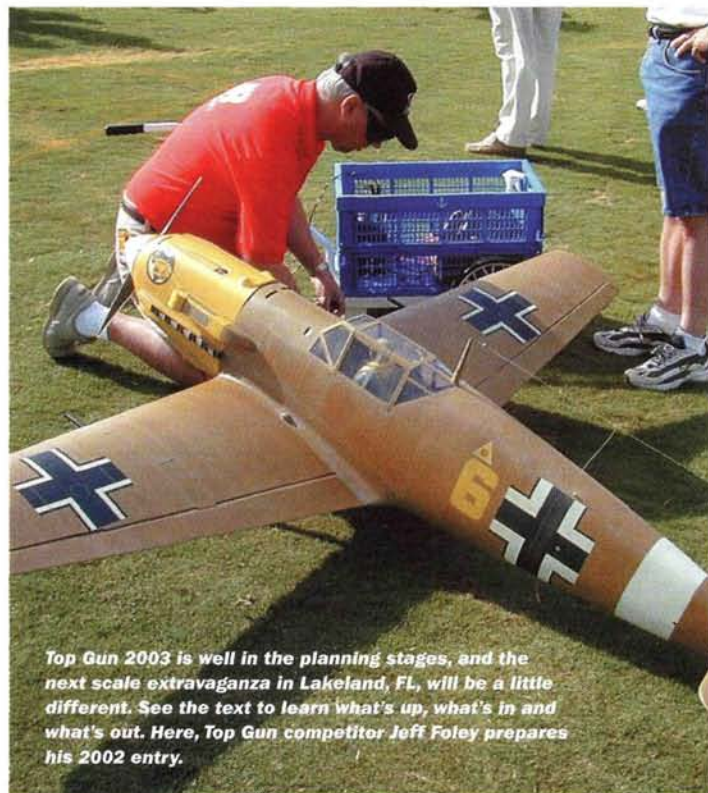
Just as when you took off, you should call your intention to land—but do it well in advance. I like to call my landing approach as I fly upwind; then everyone knows ahead of time that I'm heading for the barn. Set up your downwind, base and final approach accurately, and try to land right in front of yourself. Depending on the size of the flying field, you may have to adjust your visual cues a bit so you don't fly too far downwind before turning onto base. Just watch the other pilots, and don't be afraid to go around and try again!

After you've landed, taxi to the side of the runway and then taxi back to yourself and shut down the engine. Have your buddy return your radio and frequency pin to the impound area, and bring your model back to the pit area. Don't forget your starter and field box!

Flying at big events is a great way to have fun, meet people and learn more about the hobby. I have made several good friends at fun flies, and so will you. If you haven't attended an event yet, there's no reason to wait any longer. All you need is a free weekend and good weather!

TOP GUN NOTES

Speaking of big events, I just heard from Frank "Top Gun" Tiano that the date for the 2003 event is April 23 to 27. Frank had

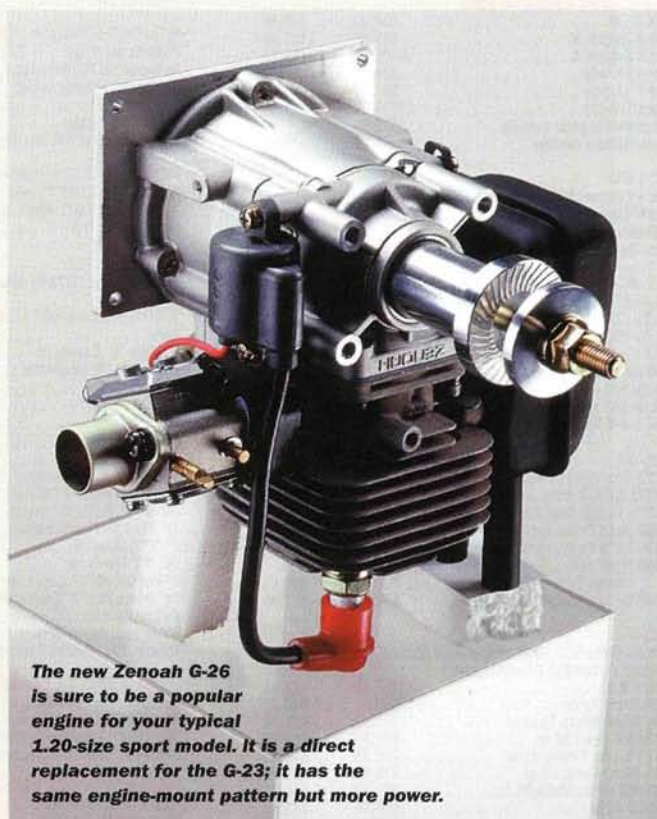


Top Gun 2003 is well in the planning stages, and the next scale extravaganza in Lakeland, FL, will be a little different. See the text to learn what's up, what's in and what's out. Here, Top Gun competitor Jeff Foley prepares his 2002 entry.

announced earlier that some changes were coming; here's what's happening so far.

Composite jet kits will be given a 2-percent adjustment on flight scores to help even the playing field with scratch-built entries. The "Traffic Pattern" maneuver will be replaced with a 10-point "Overall Realism" score to be judged throughout the entire flight. A maximum of three mechanical options will be allowed, and multi engines can be considered as a mechanical option. Scale helicopters will be back again in 2003, but if attendance doesn't pick up, the Helis competition will most likely be dropped. And Frank also says that the pit area layout will be changed somewhat to permit more spectator involvement.

If you've never attended Top Gun, check out Frank's website, franktiano.com, for the latest information on this impressive Lakeland, FL, scale competition.



The new Zenoah G-26 is sure to be a popular engine for your typical 1.20-size sport model. It is a direct replacement for the G-23; it has the same engine-mount pattern but more power.

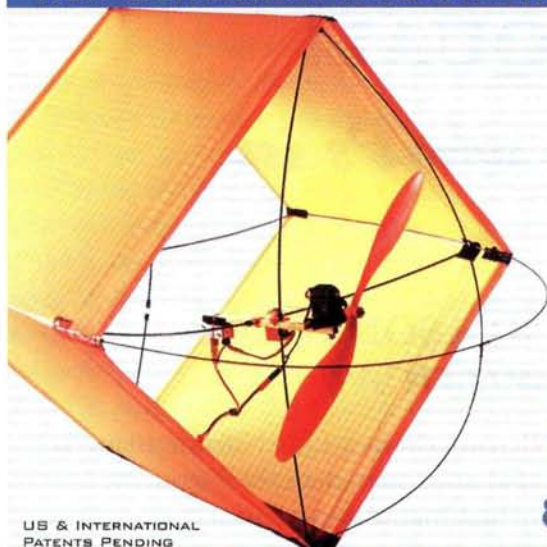
A NEW ZENOAH ENGINE!

Everyone knows how great the little G-23 gasoline engine is, but have you ever wished it had just a little more oomph? Well, here's a sneak peek at the newest addition to the Zenoah engine line: the G-26! Officially known as the G260PU 25.4cc engine, it features an improved cylinder design with four transfer ports (the G-23 has two ports); a narrow, 1mm, high-rpm single-ring piston design; a new combustion-chamber shape; and a compact, 10mm spark plug. A more effective canister muffler is also included. The G-26 will fit the same mounts, and it uses the same drive hub as the original G-23, so upgrading your model will not be a problem! The G-26 is rated at 2.35hp and 12,000rpm with the included canister muffler, and that equates to about a 24-percent increase in power over the G-23! Watch for a review in a future issue. Until then, fly safe! ✈

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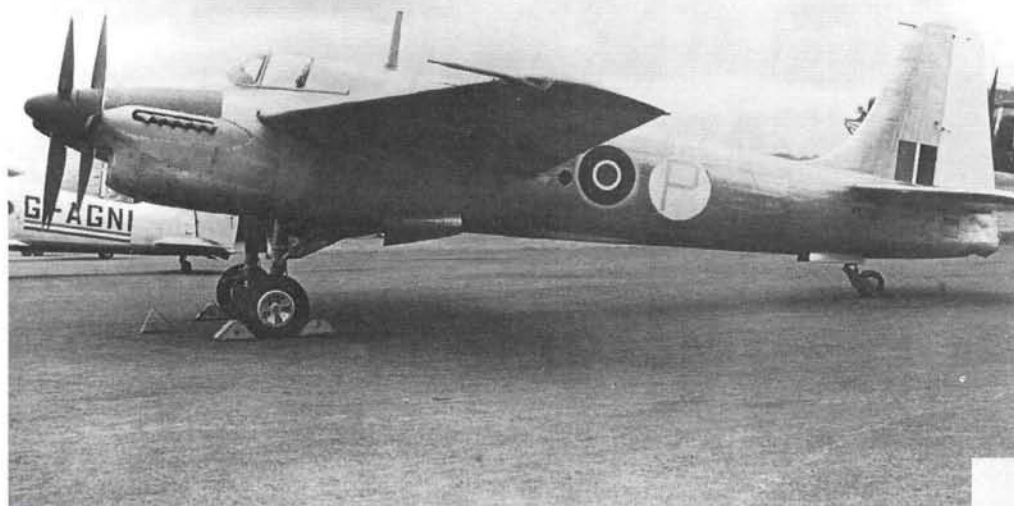
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FINAL APPROACH

BY MATT KEENNON

Micro Bristol Scout

I wanted to build a micro RC plane that would be maneuverable enough to be flown in a 20-foot-square workshop at AeroVironment Inc. The shop has old aircraft, drop cords and air hoses hanging from the ceiling; it resembles a micro indoor obstacle course. A biplane was a good choice because of its high maneuverability and compact size.

Rather than sketch out a non-scale model, I pored over my aviation books for a suitable subject, and I found one in the Bristol Scout Type D—an old favorite of modelers, probably because of its nice lines, good proportions and simple shapes. I quickly drew up

rudder and elevator out of the same thin foam and hinged them using nylon thread that gives precise, low-friction movement.

The airplane uses two custom-made servos that are 3mm micro motors set up with fine, monofilament nylon thread in a pull/pull arrangement. The wires that stick out of the control surfaces are the control horns; the threads are so fine that in photographs they are invisible. The servos are fast and accurate, and they consume little

power; each has about 60 discrete positions. The servos control rudder and elevator, and with the receiver, they weigh only 2 grams.

SPECIFICATIONS

MODEL: Bristol Scout Type D

DESIGNER: Matthew Keennon

WINGSPAN: 14.6 in.

WING AREA: 77.6 sq. in.

WEIGHT: 0.70 oz.

WING LOADING: 1.3 oz./sq. ft.

POWER SYSTEM: KP-00 motor w/3:1 custom gearbox and 2-cell, 180mAh lithium-polymer battery

DURATION: 38 min.

At first glance, the propulsion system seems straightforward, but I used a couple of high tech tricks. The model uses a little Mabuchi motor and a gearbox I made using gears from an old camcorder lens, and I paired those with a CNC-milled maple prop that has an airfoil specifically shaped for the low Reynolds number of 10,000 (it was designed by my friend and coworker John Asplund). With two 4.5-gram, 180mAh lithium-polymer cells, the model has an amazing 38-minute flight duration!

Running the prop on this gearbox is wonderful; both are very quiet. When I fly the model in the shop, it often takes a few moments for people to realize that there is a small model airplane flying up in the rafters over their heads.

All in all, this little foam biplane is a real joy to fly. It has all the quiet, smooth, maneuverable performance anybody could ever want! Now I just need to find time to put that pain finish on. ✈

Left: I designed this Bristol Scout so it could be flown in a 20-foot space. The transmitter picture with the model was custom-built for an AeroVironment project.

Below: I achieved what I set out to do. My Bristol Scout can safely navigate the cluttered confines of our shop.



A: balsa reinforces the foam airframe in the most critical areas, including the wings and tailpieces. **B:** my model used two 3mm micro motors for servos; each one has 60 discrete positions. The control surfaces are set up in a pull/pull configuration with fine monofilament nylon thread. **C:** the Bristol's gearbox was custom-made from the gears in an old camcorder zoom-lens motor. The combination of these gears with the KP-00 motor and custom-made maple prop produces smooth, quiet flight.



a plan for this semi-scale Bristol Scout D from a 3-view photo in a book. I decided on a flattened fuselage for less weight, and the wing uses polyhedral to enhance maneuverability.

To build the model quickly and keep weight low, I used mainly 1-pound white-bead foam for construction with balsa reinforcement in critical places. I carved bamboo skewers flat to make the wing struts. Since I knew I would occasionally bounce this plane off the walls and other obstacles in the shop, I decided to make the wings detachable. Small super magnets from RadioShack hold the wings on, and a strip of reinforcing carbon fiber on the fuselage prevents it from breaking into two. I made the wing out of thin hot-wire-cut sheets, which I curved over the edge of my workbench and locked into shape with a few balsa ribs. I made the